AVICULTURAL MAGAZINE

It is with great regret that we have to announce the death, on 1st August, 1955, of the President of the Avicultural Society, Mr. Alfred Ezra, O.B.E. A leading aviculturist, he had been President of the Society continuously since 1926. An Obituary notice will be published in the next number of the Magazine.

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VOL. 61 No. 4 PRICE 5/- JULY–AUGUST 1955

THE AVICULTURAL SOCIETY

Founded 1894

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Membership Subscription is £1 per annum, due on 1st January each year, and payable in advance. Life Membership £15. Subscriptions, Changes of Address, Names of Candidates for Membership, etc., should be sent to the Hon. Secretary.

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THE AVICULTURAL MAGAZINE

The Magazine is published bi-monthly, and sent free to all members of the Avicultural Society and Avicultural Society of America. Members joining at any time during the year are entitled to the back numbers for the current year on the payment of subscription. All matter for publication in the Magazine should be addressed to:—

The Editor: Miss Phyllis Barclay-Smith, 51 Warwick Avenue, London, W. 9. Telephone: Cunningham 3006.

The price of the Magazine to non-members is 5s., post free, per copy, or £1 10s. for the year. Orders for the Magazine, extra copies and back numbers (from 1917) should be sent to the publishers, Stephen Austin & Sons, Ltd., Caxton Hill, Ware Road, Hertford, England. Telephone: Hertford 2352/3/4.

White-bellied and Black-headed Caiques.

AVICULTURAL MAGAZINE

THE JOURNAL OF THE AVICULTURAL SOCIETY
AND THE AVICULTURAL SOCIETY OF AMERICA

Vol. 61.—No. 4.—*All rights reserved.* **JULY—AUGUST, 1955**

CAIQUES

By A. A. PRESTWICH (Southgate, England)

The Caiques are a small group of short-tailed, South American parrots of the genus *Pionites*. Some authorities, including Count Salvadori (1891) who, however, later (1906) accepted, even if grudgingly, the verdict of Dr. Sharpe and Hellmayr, persisted in using the generic name *Caica*. Peters (1937) gives a very concise explanation why *Caica* cannot be used for this genus. He writes :

> " Pionites Heine is a substitute name for " Caica Lesson 1831 ", which however was then employed only in the vernacular sense, " Les Caïcas ", for a group of four species *viz—Psittacus pileatus* Gmelin, *Psittacus vulturinus* Kuhl, *Psittacus melanocephalus* Linné and *Psittacus leucogaster* Kuhl. Lesson did not use Caïca in a nomenclatural sense until 1842, and when he did so it was for a species quite different from any of the foregoing. Bonaparte used Caica in 1850 as the generic name of *Psittacus melanocephalus* Linné, but this action was of course invalid by reason of Caïca Lesson 1842."

Genus *Pionites* Heine (1890)

Five forms are recognized :

melanocephala melanocephala (Linné) Black-headed Caique.
melanocephala pallida (Berlepsch) Pallid Caique.
leucogaster leucogaster (Kuhl) White-bellied Caique.
leucogaster xanthomeria (Sclater) Yellow-thighed Caique.
leucogaster xanthurus Todd.

The histories of these will be given in chronological order.

BLACK-HEADED CAIQUE *Pionites melanocephala melanocephala*.

Characteristics

Adult.—Back, wings, and tail green ; pileum black ; cheeks and throat yellow ; lores and a streak under the eyes green ; a collar

round the hind neck, bordered above and below with some bluish feathers, orange-rufous ; breast and abdomen white cream-colour ; sides of the breast, axillaries, flanks, and thighs orange-yellow ; under tail-coverts yellower ; primary-coverts and primaries black, with the outer webs deep blue, edged with green ; carpal edge partly yellow ; greater under wing-coverts and quills below black ; tail-feathers edged with yellow at the tip, underneath brown with golden reflexions : bill horn-black ; feet and naked skin round the eyes black ; iris with an inner ring brown and an outer one red.

Total length about 9·3 inches, wing 5·5, tail 2·8, bill 1, tarsus 0·5.

Female.—Like the male.

Young.—Feathers of the pileum brown with green edges (*Wagler*). (Salvadori.)

Distribution.

Eastern Venezuela and the Guianas, southward to the Rio Negro and the Rio Branco, Brazil (Peters).

Narrative

The first notice of any bird in this group is in 1751, when George Edwards, Library-Keeper to the Royal College of Physicians, gives a very creditable coloured drawing of a parrot he describes as the " White-breasted Parrot ". After a somewhat quaint, but nevertheless accurate, description, Edwards writes of his subject :

> " I found this Bird in the Hands of a Dealer in Foreign Birds, who kept a Publick House in *White-Hart Yard*, near the *Strand*, *London*. He assur'd me it was brought from the *Carraccos*, on the Continent of *America*, a Part of the *Spanish* Dominions. I have examined all the Accounts I can find relating to Parrots in different Authors, but can find none that agree with the above-described. It is a very beautiful little Parrot, and being in all Probability a Non-descript, I hope it will be thought worth Publication."

Buffon describes (1779) and gives a painting (1783) of what he calls " La petite Perruche Maypouri, de Cayenne ".
In explanation he tells us (a free translation) :

> " This name suits this bird very well, because it whistles like the tapir, which in Cayenne is called *maïpouri* ; and although there is an enormous difference between this large quadruped and this little bird, the whistle is so similar one could mistake it."

He goes on to say :

> " it does not come near human habitations and usually keeps to woods surrounded by water, and even the trees of flooded

savannas ; it makes no other sound than its shrill whistle which if often repeats in flight, and it never learns to talk.

As a rule they fly in small flocks, but often without attachment for each other, for they fight frequently and unmercifully : when some are caught while hunting, there is no means of keeping them alive ; they stubbornly refuse to take food and rather starve to death ; they are so stubborn that they cannot even be made docile by blowing tobacco smoke, which is the usual way of training even the most obstinate parrots. If they are to be reared they must be caught young, and they would not be worth the trouble of rearing, if their plumage were not so beautiful and their form so remarkable."

Various later writers include, with and without acknowledgment, Buffon's " field-notes ", whole or in part. It would be of interest to know the source of his information, as it is unlikely to have been first-hand.

The majority of the great ornithologists of the late eighteenth and early nineteenth centuries included this species in their works. The principal are :

Linné (1758) responsible for the specific name when he describes the species as *Psittacus melanocephalus*.

Brisson (1760) calls it *Psittacus Mexicanus pectore albo* and *Le Perroquet a poitrine blanche du Mexique*.

Latham (1781, 1790, 1822) refers to it as the White-breasted Parrot, and repeats much of what Buffon has told us.

Miller and Shaw (1796) give a good coloured plate of *Psittacus atricapillus*, here said to be a variety of *P. melanocephalus* Linnæus. In this variety " the hind-part of the neck . . . is of a pale crimson, or rose-colour ". Then follows a summary of Buffon's " field-notes".

Levaillant (1805) deals exhaustively with *Le Perroquet Maïpouri*, and gives two coloured plates, male and immature—in the latter the feathers of the breast are shown as of a greyish-white with orange scalloping to the edges ; the tail and vent, light brown with greenish scalloping ; and the nape, crown, and throat, all scalloped with green : and, of course, Buffon's observations are given.

Brehm (1842) gives a condensed version of Buffon and Levaillant and a coloured plate of *Psittacus melanocephalus*.

Reference should also be made to Shaw (1812) White-breasted Parrot ; Vieillot (1817) *La Perriche maïpouri* ; Kuhl (1820) *P. melanocephalus* ; and Spix (1824) *P. melanocephalus*.

During the following fifty years there are, of course, many references to this Caique but they are, in the main, just references and none is very informative.

It is left to Sclater (1887), writing on British Guiana and its birds, to express an opinion differing from Buffon's. He writes :

> " The *Caica* [*melanocephala*] is remarkable for its excessive friendliness and sociability. I brought a specimen of it home with me, which is certainly the tamest bird I have ever come across."

And Lloyd (1895) concurs when he says :

> " *Caica melanocephala* is one of our handsome little parrots that takes readily to domestication, becoming very affectionate, allowing itself to be handled and petted without the slightest resentment. It is particularly plentiful on the Mazaruni and Puruni Rivers, where it nests in holes high up the trunks of trees. We have often tried to get at the eggs, but could never succeed."

It does seem a little remarkable that American Museums of Natural History are able to publish volumes of six or seven hundred pages on the birds of various South American countries, and yet tell us little or nothing of the habits of the birds catalogued. They are, in fact, mainly just distributional lists of where specimens, often many, have been procured.

White-bellied Caique *Pionites leucogaster leucogaster*

Characteristics

Adult.—Back, wings, and tail green ; pileum, hind neck, and upper ear-coverts orange-rufous ; lores, sides of the head, and throat yellow ; breast and abdomen white cream-colour ; axillaries orange-rufous ; flanks and thighs green ; under tail-coverts yellow ; wings as in *C. melanocephala* ; tail underneath dusky golden : bill white ; naked skin round the eyes reddish flesh-colour ; feet pale brown ; iris reddish brown.

Total length about 9·5 inches, wing 5·5, tail 2·7, bill 1·03, tarsus 0·55 (Salvadori).

Distribution

Valley of the lower Amazon (Peters).

Narrative

Psittacus leucogaster was first described by Kuhl (1820) after Illiger. The first coloured plate is by Lear (1832) when he depicts *Psittacus badiceps*, Bay-headed Parrot. There is no description but the plate shows a White-bellied Caique with the forehead and crown chestnut-brown.

Bourjot Saint-Hilaire (1837–38), in the third (supplementary) volume of Levaillant's monograph of the parrots, gives a good plate by M. Werner of *Le Perroquet à ventre blanc* (*Psittacus leucogaster*) which he considers a mere variety of *melanocephala*.

von Pelzeln (1865) expresses the view that *P. xanthomeria* and *P. leucogaster* are only varieties of *P. melanocephala*. Dr. Finsch (1868) maintains they are independent species, stating that colourings make it problematic whether they are varieties or birds of different ages. Later, von Pelzeln (1871) admits that *P. leucogaster* may be considered an independent species, but still considers it not improbable that *P. xanthomeria* is only a variety of *P. melanocephala* or of *P. leucogaster*.

Yellow-thighed Caique *Pionites leucogaster xanthomeria*.

Characteristics

Adult.—Very much like *C. leucogaster*, from which it differs in having the thighs and flanks lemon-yellow instead of green (Salvadori).

Distribution

Eastern Ecuador and eastern Peru to the Rio Machados western Brazil (Peters).

Narrative

Dr. Sclater (1857) "*On a Collection of Birds transmitted by Mr. H. W. Bates from the Upper Amazon*" writes :

> "This apparently new species, of which the only two specimens sent have passed into the collection of the British Museum, closely resembles *C. leucogastra*, Kuhl (*badiceps*, Lear), but has the flanks and thighs yellow instead of green, and exhibits some minor variations in shades of colouring."

But for brief notices which raised doubts as to the validity of the species this Caique was virtually still unknown when "Two specimens of the rare Yellow-throated Parrot, *Caica xanthomera* (G. R. Gray), . . . along with the Pygmy Marmoset, also quite new to the collection" of the Zoological Society of London arrived on 27th April, 1877. Two years later Dr. Sclater (1879) refers to these birds when he writes :

> "Of this beautiful Parrot [*Caica xanthomera*] we received two living examples from Yquitos, on the Peruvian Amazons, in 1877, as already recorded. One of these is dead ; but the other is now in fine plumage, as the accompanying sketch by Mr. Smit (Plate xxviii) will show. Besides the type in the British Museum, from the Rio Javari (Bates), and a single example obtained alive by Natterer on the Madeira (Pelz. Orn. Bras. p. 264), our specimens are, I believe, the only ones known of this species."

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White-bellied Caique *Pionites leucogaster leucogaster*

Characteristics

Adult.—Back, wings, and tail green ; pileum, hind neck, and upper ear-coverts orange-rufous ; lores, sides of the head, and throat yellow ; breast and abdomen white cream-colour ; axillaries orange-rufous ; flanks and thighs green ; under tail-coverts yellow ; wings as in *C. melanocephala* ; tail underneath dusky golden : bill white ; naked skin round the eyes reddish flesh-colour ; feet pale brown ; iris reddish brown.

Total length about 9·5 inches, wing 5·5, tail 2·7, bill 1·03, tarsus 0·55 (Salvadori).

Distribution

Valley of the lower Amazon (Peters).

Narrative

Psittacus leucogaster was first described by Kuhl (1820) after Illiger. The first coloured plate is by Lear (1832) when he depicts *Psittacus badiceps*, Bay-headed Parrot. There is no description but the plate shows a White-bellied Caique with the forehead and crown chestnut-brown.

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Yellow-thighed Caique *Pionites leucogaster xanthomeria*.

Characteristics

Adult.—Very much like *C. leucogaster*, from which it differs in having the thighs and flanks lemon-yellow instead of green (Salvadori).

Distribution

Eastern Ecuador and eastern Peru to the Rio Machados western Brazil (Peters).

Narrative

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PALLID CAIQUE *Pionites melanocephala pallida.*

Characteristics

Similar to *C. melanocephala*, but with the thighs, flanks, and also the under tail-coverts paler, lemon-yellow, with no orange tinge (Salvadori).

Distribution

Eastern Colombia to eastern Peru (Peters).

Narrative

von Berlepsch (1889) says (a free translation) :

> " The birds of eastern Peru and eastern Ecuador differ from those of Trinidad (which presumably are to be regarded as types) and Guiana by the much brighter, almost citron-yellow colouring of the hypochondria and tibia, which in the birds from Trinidad and Guiana are more or less orange-red or salmon coloured. The throats and sides of the head and subcaudal feathers are also more brightly yellow in the birds of the upper Amazon. These should perhaps be separated as *C. melanocephala pallida* Berl.".

Reference to Trinidad is, to say the least, a little puzzling.

Count Salvadori (1891) pronounces :

> " As the differences pointed out by Graf von Berlepsch as distinctive of the birds from E. Peru and E. Ecuador seem constant, I have been induced to regard them as belonging to a distinct species " [*Caica pallida*].

Between 1875 and 1880 Stolzmann explored very extensively in Peru, and is responsible for many of the observations in Taczanowski's *Ornithologie du Pérou* (1884–86). Of *Caïca melanocephala* (actually *P. m. pallida*) he says (a free translation) :

> " Not very numerous at Yurimaguas, keeping together in small flocks composed of a few pairs. It appears that when eating on a tree they place a sentinel, for on two occasions I have seen a single bird perched on top of a tree in complete inactivity, while the whole flock was occupied. On flying away they produce a loud cry, *tschirli-tschirli*. While they are resting in the crown of a tree, an individual can be heard to make strange, single sounds which are not very harmonious. According to the inhabitants of the district it nests in the holes of trees. At the end of April I have seen young ones in full plumage.
>
> In the sierra of northern Peru they are often reared in captivity and are valued much more than all the other parrots. I must confess that of the large number of domesticated parrots I have seen during my travels, I have never seen any as pleasing or so

amusing. For several months I reared a pair and I brought one of them to Europe; these are my observations about these individuals. They are as sociable as other parrots; when they have no companion of their own species in captivity they soon attach themselves to some other parrot, even if it is much larger. When one of mine was stolen before my departure for Europe, the other became attached to a *Chrysotis* which it never left. As soon as they were separated, the *Caïca* used to call his companion by producing a plaintive sound, *piou*. Their movements are quick and precise; on the ground it runs more quickly than all the other parrots, hopping to quicken its pace. It climbs on sloping branches with great skill, without using its beak like the others. It eats everything: rice, potatoes, flax seeds, bananas, cherries, meat, etc., preferring above all meat and rice. Grasping the food in one claw, it holds it far from its body and lifts it up much more than other parrots, which gives it a steady and firm footing.

It had an antipathy to women and children which developed during the voyage to Europe. As soon as it caught sight of them it came down from its perch and approached in order to bite the hated person. Once it bit a dwarf, mistaking him for a child. With men it lived on the best of terms and only used its beak in exceptional cases. It was very fond of playing with the other parrots, chasing them, seizing their feet, and hopping round them in a most comical manner when this occurred on the ground.

It hated all the small species of parrots and on the other hand was afraid of the *Aras*. The *Brotogerys* which were reared with it used to run away from it and at every opportunity it used to bite and molest them.

They learn to whistle perfectly but are not capable of grasping any melody; the scale of their voice is fairly extensive and their whistling is very pure. As soon as one begins to whistle at them, they seize the notes, but interpret the melody in their own way; they conclude without any discord the melodies started for them, but always in their own style. It whistles in all positions, perched, lying on its back, hanging head down from a branch, alw.., with the same ease and always with the same purity and intensity. At Yurimaguas I noticed that they liked to whistle at the approach of a storm; sometimes it is difficult to persuade them to whistle. They learn to pronounce *piouitschou*, but in a louder voice than the *Brotogerys*.

I observed that they have a liking for passing through narrow openings. When there is a wide entrance, an open door, and a narrow opening at the side, they prefer to choose the latter, often turning the body sideways and spreading out their wings to

reduce their circumference. The inhabitants of the country assert that they spend the night in the holes of trees, which is likely, since in captivity they do not like sleeping on a perch. Mine used to sleep in a box or under a pot. When they are placed there for the night they begin to whistle and chatter.

The inhabitants teach them to dance. In the evening they put them on a table illuminated by a candle and sing or whistle while clapping their hands ; the parrots hop to this noise. For such a dancing parrot one pays there from 40 to 50 francs."

Pionites leucogaster xanthurus.

Characteristics

Pileum, sides of the head (down to and including the auriculars), hind-neck, and sides of the neck dull apricot orange ; back, rump, upper tail-coverts, upper wing-coverts, and secondaries externally bright parrot green ; tail deep chrome to primuline yellow, some of the rectrices with a basal area of parrot green, concealed except on the middle pair ; primaries and their coverts with the inner webs black, and the outer webs Berlin blue with a narrow outer margin of green ; under wing-coverts parrot green, the carpal edge mixed with yellow ; throat, cheeks, and sides of the neck below empire yellow ; breast and abdomen soiled white, with a wash of pale yellow in fresh plumage, the sides shaded with light salmon orange ; tibiæ and under tail-coverts empire yellow ; " iris cadmium yellow ; eyelids white ; feet flesh white ; bill bone white." Wing (type), 141 ; tail, 79 ; bill, 25 ; tarsus, 16 (Todd).

Distribution

Rio Purús, Brazil (Todd).

Narrative

During the early 1920's the Carnegie Museum received several collections of Brazilian birds from Samuel M. Klages. Included were three specimens of a Caique considered by Todd (1925) to be new, and described and named by him *Pionites xanthurus*. No mention of this sub-species is made by either Peters (1937) or Pinto (1938) and one can but conclude that neither recognizes it.

Todd writes of *xanthurus* :

" This species is obviously the Rio Purús representative of *P. xanthomeria* (Sclater), which it closely resembles in all respects except for the color of the tail, which is mostly yellow instead of green, the shafts of the feathers being white. We have three specimens, a pair in worn plumage from Hyutanahan, and a single female in fresh feather from Nova Olinda, which latter

has been selected as the type. The single male shows even less green on the basal part of the tail than either of the females."

There is, as yet, no vernacular name for this sub-species.

In captivity

Importation.—Although the Caiques occur over a very wide area they are seen seldom enough in captivity to fetch a relatively high price. They have never been imported in any number, merely a pair or an odd bird at very irregular intervals—this applies to Great Britain, at least.

Black-headed Caique.—The " White-breasted Parrot " found by Edwards in about 1750 in the hands of a publican-dealer was presumably a live bird, in which event it is by far the earliest recorded importation of a Caique of any species.

The Zoological Society of London purchased an example in 1855 and two in 1866, and since then has owned a good many, mainly single birds.

During the last thirty or forty years there have been pairs in most of the larger private collections—H. D. Astley, H. Whitley, J. Spedan Lewis, Mrs. G. T. Clark, and others.

This Caique is not uncommonly kept in the United States where, in some regions, it is known by the not inappropriate name " Little Breeches ", or as " Dirty Face ".

Pallid Caique.—The Zoological Society of London purchased a bird listed as *Caica melanocephala* (Pale variety) on 3rd November, 1891. This was presumably a specimen of *pallida*.

White-bellied Caique.—This is the most commonly imported species. A specimen was purchased by the Zoological Society of London on 13th October, 1880, and a second on 4th April, 1883. Since then there have, of course, been others in the Gardens.

Pairs have been in the collections of Mrs. Dalton Burgess, H. Whitley, J. Spedan Lewis, etc. ; and Miss Kay Bonner has a pair at present.

Yellow-thighed Caique.—Two specimens were purchased by the Zoological Society of London on 27th April, 1877.

I have no record of later acquisitions, or of examples in private collections, but there were fairly frequent, small importations in the 1920's and early 1930's.

Character.—Buffon did the whole genus a great injustice when he implied its members were intractable. I think everyone who has ever possessed a Caique will agree they are amongst the most desirable of all species of parrots. They are very intelligent, even more playful and amusing than some of the very playful lorikeets and, when tamed, are most affectionate. Some, however, fail to advance beyond the merely friendly stage, remaining very nervous, and refuse any undue human familiarities.

Being very active birds they should not be confined permanently in parrot cages. They are best suited to aviary life, or at least have an outside flight in which they can exercise.

Much could be written about their general behaviour : the dignified manner, holding themselves very upright, in which they walk along a branch ; the way they hang from a branch or wire-netting by their beaks only and while thus suspended in the air box and spar ; how they wrestle on the ground, rolling over and over and playing generally like a couple of kittens—all of which must be seen to be properly appreciated.

The Caique would indeed be the perfect pet but for one very great drawback—its voice. Its cry is loud and can perhaps best be described as a shrill whistling-shriek. They delight in uttering it repeatedly and often for minutes on end ; such is its shrillness that even their greatest admirers must admit it is very trying indeed, so much so that it is virtually impossible to keep a pair in a house, although a single bird would naturally prove less noisy and there might even be an occasional very tame specimen that has been taught to forget this distressing form of vocal expression.

They are credited with being very sensitive to cold, but once fully acclimatized they seem reasonably hardy. They should, however, always be shut in their shelters at night and in the winter artificial heat must be provided : we maintain a minimum temperature of 50° F. Naturally, they need warmth and plenty of care when newly imported.

Food presents no difficulties. In theory they should be fed on a varied seed mixture consisting of four parts sunflower seed, three parts canary seed, two parts oats, two parts buckwheat, one part white millet, one part hemp, and a few peanuts : but preferring sunflower seed to all other they will most probably, in the usual parrot manner, pick this out and scatter most of the rest. Actually, we have not found that almost unlimited sunflower has had any harmful effect. It is, however, very important that they have plenty of good, sound fruit—soft, sweet apple and grapes being the favourites. Garden peas in the pod are a welcome addition when in season and an occasional soaked millet spray is appreciated.

Breeding.—Caiques pair readily in confinement but aviculturists have had little success in breeding them. This is probably mainly due to lack of effort, few having experimented in this direction. Sexing presents a matter of considerable difficulty. The sexes are identical as regards plumage and the only difference lies in the beak. When compared the beak of the male is seen to be broader and rather shorter than that of the female which has altogether a more " hennish " appearance. But this comparison is not easy and requires experience in such things.

The only recorded breeding success in Great Britain is Lady Poltimore's hybrid, Black-headed × White-bellied Caique, reared in 1936. In this event four young were hatched ; two died within a few days, one lived for six or seven weeks, and one was reared : " exactly like the male in plumage, except that his thighs are green like the female, and he has more of her salmon colour at the back of his neck. At a distance, it is difficult to distinguish him from his male parent, and his colour and plumage are as good as that of the adult pair " (Poltimore, 1936). The young one proved to be a male and lived for nearly two years.

In the United States, Gilbert Lee, of Los Angeles, has been successful in breeding the White-bellied Caique. He had three young ones hatched on 1st, 2nd, and 5th April, 1932, and all three were fully reared (Lee, 1935).

Expectation of life.—The potential longevity of Psittacine birds is well known to be high, although well-authenticated records are considerably lower than the ages assigned by popular repute. Exact records for *Pionites* are few, but it is certain the maximum age is considerably in excess of any mentioned here.

Dr. Chalmers Mitchell (1911) in his "*Longevity and Relative Viability in Mammals and Birds*", based on examples kept in the London Zoological Gardens, includes the following figures in the PSITTACI :

	No. of Indiv.	*Av. dur. in months.*	*Max. dur. in months.*
Caica, whole genus . .	16	47	248
C. leucogastra . . .	2	6·5	8
C. melanocephala . .	12	39	104
C. xanthomera . .	2	130	248

Dr. Mitchell points out that, in the period covered, the examples of the PSITTACI group " were kept in a rather crowded house, well warmed in cold weather. A certain number of them were placed out of doors (chiefly Macaws and Cockatoos) in good weather, but were chained to perches. The vast majority of them were in relatively small cages, and never had access to open air, whilst none had the opportunity of flying ". The conditions under which the Caiques were apparently kept cannot be said to have been conducive to health. The wonder is that one Yellow-thighed managed to attain an age of over twenty years in captivity.

Records for the period 1911 to 1926 are not readily accessible, but search reveals that Black-headed died in 1917 and 1918 after 125 and 147 months respectively. The later records show that nine examples died in the Gardens between 1934 and 1946. The present Parrot House was opened in 1930 and no matter what one's opinion of it there is no gainsaying the conditions are vastly superior to those obtaining in the old. The later period shows an improvement of approximately 20 per cent in the average for the whole genus, and

the improved conditions must in part be responsible for this. It must be stressed that these figures refer only to the birds' life in the Zoo. It is very difficult to draw any conclusions because almost invariably little or nothing is known of their previous history : some are undoubtedly newly-imported, whereas others have probably been pets for a number of years. For instance, the Yellow-thighed listed below is said to have been in the possession of W. W. Cobbett for some thirty-five years prior to its being presented : if indeed, a fact, this would make it at least forty-two years old at the time of its death.

	No. of Indiv.	*Av. dur. in months.*	*Max. dur. in months.*
Pionites, whole genus .	9	56·45	178·5
P. leucogaster . .	4	64·7	178·5
P. melanocephala . .	4	42	146
P. xanthomeria . .	1	81·5	81·5

Major Flower (1923) records that a White-bellied Caique died on 10th June, 1923, after being in the Giza Zoological Gardens, Cairo, for 13 years, 7 months, 8 days.

A Yellow-thighed lived in the Philadelphia Zoo Gardens for 9 years and 8 months, dying in 1924 ; and another, in the National Zoo Park, Washington, was still alive in 1929, after 6 years and 10 months.

The fully authenticated record, however, must surely be held by the pair that successfully reared a young hybrid for Lady Poltimore in 1936. They are still alive and flourishing, after being in Lady Poltimore's possession since the spring of 1931, prior to which Miss E. M. Knobel had them for several years. They cannot therefore be far short of thirty years of age.

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In this review of the genus *Pionites* no attempt has been made to cite every paper mentioning or discussing it. To do so would entail a bibliography of very considerable length. Such were formerly thought to reflect the learning of authors but nowadays are mainly a source of annoyance ; in addition, their compilation may be considered a waste of time and money. The literature has, however, been searched very thoroughly and the following are the more important references.

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OBSERVATIONS ON A BLACK WOODPECKER IN CAPTIVITY, ITS PERCEPTION OF FOOD THROUGH LAYERS OF WOOD

By Eugenio Callegari (Ravenna, Italy)

About the middle of June, 1954, I found the nest of a Black Woodpecker (*Dryocopus martius*, L.) in the valley of Genoa, about 1,600 metres above sea-level. It was in an old beech tree, not 4 metres above the ground, and contained two fledglings. One was within the hollow, the other was leaning out as far as its abdomen, and stood as stiff as stiff could be, hoping to escape my notice. I lay in wait behind a rock to identify, if possible, the food brought by their parents, a matter of great difficulty, as they swallow most of it—only the last morsels being visible stuck in their beaks.

As soon as the fledgling thought it was alone it drew back, and twenty minutes afterwards one of the parents appeared. When it noticed me it at once gave out its alarm note, but did not draw near, thus making the identification of the food quite impossible.

Fearing that the young ones might abandon their nest (their feathers being almost completely developed) I hastened to catch them, and started back to Ravenna to try to bring them up.

My first care was to inspect their excrement with a view to finding out what would be suitable food. This consisted partly of chitinous remains of big, black ants, of the genus *Camponotus* Mayr., which make their nests in old trees, and partly digested matter, probably derived from larval stages of the same. I did not, however, deem it necessary to feed them on their natural food, but I replaced it by mole-crickets at first, and then by a mixture of dry ant-pupæ, some meal derived from silk-worm larvæ, tiny bits of ox heart, bread, and milk.

The two creatures, however, were shy and had to be fed artificially, the food being forcibly thrust down their throats. They showed a dislike for this food and also for living silkworms. Then I noticed that one of them was suffering from bad diarrhœa and had got very thin. I then made up my mind to catch wood-boring ants, my only hope of saving the young birds from certain death. To begin with I found this very difficult, but little by little I got into the way of it, and was encouraged in this odd job of wood-cutter by the fact that the youngsters began to welcome the ants and still more their pupæ. So in the long run they became tamer and even seemed inclined to swallow the pincers with which I fed them.

In about a month the sick bird increased in weight, strength, and liveliness and became quite normal. I placed them in a comfortable aviary, with trunks for perching ; they recognized my step and my

brother's ; called to us when hungry, though inclined to be shy in our presence. They gave a trill of joy at our entrance, but when we stretched out our hands towards them often grew suspicious and drew back without taking the food. They were even more suspicious with strangers.

When they had completely recovered I fed them again on the usual mixed food, but shortly afterwards the other bird had diarrhœa trouble too. I hastened to gather *Camponotus* pupæ, but it was no use ; four days later it died. I felt very sorry, for Woodpeckers are more charming than most birds.

As regards the diarrhœa troubles from which both birds suffered, I ascribe them to food fermentations due to the heat of summer. I therefore prepared fresh food twice a day, and the surviving Woodpecker is still in perfect health. I feared they might suffer from the heat, but could not prove this.

Ginanni, in his work on Ravenna's pine woods, not only states that these birds haunt this zone, but breed in it as well. Before coming to the point, I want to state that I gave the two Woodpeckers various kinds of Lamellicorne coleoptera larvæ, *Cetonia*, *Melolonta*, and some others not yet identified, which they consistently refused. On the other hand, they seemed to welcome either larvæ or nymphæ, of *Cerambycide* coleoptera. They also refused either fresh or dried fruit.

When out for a walk one day towards the end of October I happened to come across two small stumps, which I uprooted easily. The stumps were intersected by a maze of burrows, containing the appetizing ants, which I offered my captive bird. The Woodpecker approached, rubbed its long verniform tongue over the burrows, and drew out its favourite ants. A few days later it showed no further interest in the two stumps, though many burrows had not been inspected. The only thing I could do was to remove them from the cage. In order to satisfy my curiosity, I then cut them to pieces with a hatchet, and was surprised to find only one ant left.

On another occasion I gave the bird a bigger stump to inspect, but it behaved in just the same way. It started rubbing its tongue over it just as before, and taking no heed of the burrows leading outside, and cut holes exactly where the ants were to be found. But after a while this stump too was no further use, and when I cut it to pieces not one ant was found, in spite of the spaces left unexplored by the taps of the Woodpecker.

I applied to Dr. Branzanti, *dell' Ufficio Agricolo Patrimoniale*, who kindly gave me permission to take from the pine woods as many stumps and poles attacked by ants as I wanted. The results were just the same. Even when I put stumps of about a hundredweight each in the aviary, after a certain time the Woodpecker ceased to be interested in them, and I could but realize that the supply of ants

had either disappeared or was reduced to a few specimens. Very often the bird reached the hidden prey through layers of wood completely free from burrows, and still in a perfect state of preservation on account of the resin permeating them.

I find no hint of this in the works on ornithology at my disposal, as the various authors are of opinion that the bird locates the prey by introducing its tongue into the burrows of the grubs. Only in the work *Birds of America*, prepared under the auspices of the Audubon Society, I came across these words: "They locate their hidden prey with great accuracy, and often cut small holes directly to the burrows of the grubs."

In short, the hidden prey is located perfectly in the stems of trees by the tongue, no attention being paid to the outside holes. Woodpeckers are actually never disappointed in their work.

Let us consider the big clefts bored in the stems of trees by Black Woodpeckers to reach their prey, clefts often several centimetres deep. To justify these phenomena we must acknowledge these creatures to be gifted either with the power of reasoning or with a "sixth sense". I entirely reject the former hypothesis and accept the latter, based on experience.

I cut three poles more or less alike out of a wooden fence, one of which contained an ants' nest. I stopped the outside holes with beeswax and placed them simultaneously in the cage. Eight minutes afterwards the Woodpecker had swallowed its favourite grubs, leaving the other two poles untouched. After some days, when the ant supply had failed, it drew out of one of the other two poles some very tiny xylophagous larvæ. I made a small box of fir wood, the sides of which were three centimetres thick. Inside, by means of partitions, I made eighteen cells, of which eight contained sawdust, six ants, and four were empty. The Black Woodpecker inspected the box by rubbing its tongue over it, and cut directly to one of the cells containing the ants, close to one of the inside wooden partitions. A short time afterwards it left off and took no further interest in the box, and further efforts on my part to get it to search again were useless. Also in vain was my cutting two little holes with a nail directly to two cells containing insects. There was nothing left for me to do but take the box out and replace it with stumps which were at once exploited to the utmost. I got a tree trunk hollowed out with a lathe, leaving an external thickness of 3 centimetres; then, with thin wooden partitions, I delimited seven spaces of 3 centimetres thick each. The inmost space I called Number 1, and that nearest the end Number 7. The numbers 1-3-6 contained ants, the others were empty or full of sawdust. The Woodpecker started cutting a hole directly to Number 4, but it scarcely cut it, then it moved on to Number 3, cut a first hole, out of which it seized the ants, then enlarging it, invaded Number 4. I must

emphasize that these spaces were 7 centimetres in diameter, through which the bird had to thrust its head without spoiling its feathers. Then it cut another hole in connection with Number 3, angled at about 40 degrees in respect of the first. Before eating the ants it cut a hole directly to Number 1, then another angled about 90 degrees in respect of the first. During this process it hopped every now and then to the first hole to eat the ants that were coming out. This would support the theory of some authors that Woodpeckers, to drive out insects, tap the tree-stems, and then run to the holes to seize those that come out.

On the morning of the second day it had located the third space, Number 6, boring it twice. This time, however, to get at the ants it cut also the next partitions, but the ants had moved on through these holes to spaces previously empty. Late in the afternoon I removed the stump, fearing the bird might hurt itself with the nails, and detected a third hole in space Number 1, angled about 180 degrees in respect of the first. Thus the Woodpecker bored eight holes through sound wood, 3 centimetres thick, one hole being cut uselessly, while the other seven were of the right size, showing its ability to locate food with its tongue.

I again took the above-mentioned box, and to attract the attention of the Woodpecker I enlarged the two holes I have already mentioned with a big nail, and introduced two live ants. After a short time the bird noticed, and swallowed one of them, then it started enlarging the hole I had made. After boring down 2 centimetres it left off, and resumed working in the direction of the same cell but to one side of it where the two box sides joined together. After a short time, however, it left off again. A few minutes later it caught sight of the second ant and ate it up, then it bored the cell and swallowed the food within. Afterwards it located a third cell supplied with ants, and this time too it cut a hole near the inside wooden strip. Then it left off again for good.

Its bewilderment misled me too and suggested several hypotheses to me, the most logical of which I think is that its bewilderment must depend on the fact that the cells, wherein I had put the ants, were not full and therefore the air between the ants and the lid acted as insulator. I changed position in the box so that the ants might be in contact with the outside walls.

I placed some ants as a bait in the cell it had cut the previous day ; but the Woodpecker preferred basking in the sun, and the ants went away. All at once it caught sight of one of them and ate it up. Then it began to rub its tongue against the box at the point where the wooden strips joined together, though the tongue was rubbed so rapidly against the box the bird located the right spot, where it cut a hole and gained the reward it deserved ; then, again bewildered, left

off for good. I could only replace the box with the usual stumps in order to keep it in good health for further experiment.

I am thoroughly unacquainted with the nature of the phenomena guiding the Woodpecker and with the reason for its bewilderment when confronted with the box. If further experiment should lead me to a logical hypothesis I will give this information in a further article.

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ABYSSINIAN LOVEBIRDS

By A. CLARENCE (Salisbury, Wilts, England)

It was once said that " to be wise too late is the exactest definition of a fool ", and this, I fear, leaves me well in the running. At any rate it is very expensive !

The Abyssinian Lovebird has not a pleasant character, but this is made up for by its handsome appearance. To me it is the most beautiful of the lovebird family—the cock bird particularly. It was a master stroke of Nature to draw a line of black the full length of the wing, and add a scarlet beak and forehead as foil to a viridian green body.

As to character, woe betide any trusting simpleton. Quietly sidling up with easy friendly movement, he will quickly bite through the foot, or leg joint for preference. Even a gentle harmless little Cayenne Rail did not escape the nastiness of a pair I own, and received a bite at the main joint of one of its slender legs. I just missed seeing the assault, but the flowing blood left its trail, and he was soon caught up. It eventually recovered, but will always limp. On another occasion, a second sufficed between a Bullfinch having two legs and one. No wonder a young hen Abyssinian enjoyed scalping its four defenceless brothers and sisters, while still in the nest, and this at a carefully chosen moment.

The Abyssinian seems to prefer sunflower to other seed. It is a fruit-eater, and will eat almost any fruit. It is particularly fond of sweet apples, and failing anything better if will even eat that sour horror so beloved of English cooks—the Bramley Seedling, which not even the wild birds will touch if there is anything else to go for.

When I am obliged to leave my birds to underlings and the mentally deficient, I thread a dozen apples on a wire and hang them so that they are reached from below, hoping thereby to induce the birds to eat the bottom one first. Also a wire of dried figs and another of dates act as a reserve against lack of observation and forgetfulness. Very large seed hoppers with glass fronts and an extra hidden water supply which the birds can see is very essential, and are a relief to one's mind. Abyssinians are particularly partial to sprouting sunflower and oats during the nesting season.

At my old home near Salisbury the Brown Owl is very numerous. These would plane over the aviaries on silent wing and then let out a screech, which has scared the wits out of many a poacher—and myself. It is quite incredible what a shock that screech can be—one's hair does stand on end! This caused the death of one young Abyssinian, while some years ago six young Splendids met with a similar fate, flying in their panic against the far wire. There were nine of them and six were picked up dead in a row at the end of the aviary with broken skulls. They are, of course, noted for their thin skulls. The speed with which these particular parrakeets can fly has to be seen to be believed. On one occasion a cock Splendid escaped. It was faster than the flash of a Kingfisher—and good-bye.

I had hoped that my "Caller-up-in-Chief", a cock Princess of Wales, would lure him back, but he was too far off and the wind unfavourable. The Princess of Wales' penetrating voice steered home many a budgerigar lost for days and once brought back a Meyer's Parrot. This Meyer's cut a round hole in strong half-inch mesh wire, neatly turning over each point so that the exit was smooth and then disappeared for two days into an orchard.

When obliged to leave birds to the care of other people, I find it helpful to them to fix a funnel through the wire so that seed can be poured into its receptacle without their entering the aviary. Particularly useful is this when dealing with Abyssinians, who are shy and wild by nature and very secretive when nesting.

It is well to remember to use soft, loose fitting gloves when handling them, for like bulldogs, when they bite they do not let go.

A few years ago I bought a cock Abyssinian and was lucky to be given a hen. The pair were put into a 20 feet aviary, 12 feet high at the apex. As a protection from the weather they had access to a small conservatory, which was warmed during the winter. At the end of the aviary grew a substantial elder bush, which shrub birds dislike biting, possibly owing to its unpleasant smell when bruised.

Into the apex, and wedged among the branches, was fixed an upright nesting-box, which was made of one-inch wood. It was 15 inches high and 7 inches square and was filled to a depth of 6 inches with a mixture of sawdust and dry earth compressed—dryness being essential to warmth in cold, wet weather. Into this a deep budgerigar nesting bowl of wood was securely embedded. The box was put up in January for the reason that in the winter months a box of smaller and lighter make had been hung in the greenhouse. The Abyssinians slept in the latter and eventually in December had a clutch of eggs, which were fertile, but did not hatch, no doubt due to the hard frosts and to there being insufficient warm material under the eggs. It was obviously not to their liking, and as soon as the box in the elder bush was put up they took possession. It was well

hidden and this appealed to their secretive nature. It was also protected from winds and no rain could get to it. A bundle of hazel saplings stood nearby in a bucket of water. These the birds chewed off in small bits and carried into the nest, though so unobtrusively that no one saw them do it.

The four eggs hatched in due course after a long incubation of about a month, and eventually the young birds were strong on the wing.

The same pair started a third nest in the autumn and all seemed set fair (they seem to breed all the year round). Then I learned a lesson !

A young hen of the first clutch, now about eight months old, entered the nest and killed her four fully-fledged brothers and sisters. The massacre took place no doubt while the parents were feeding in the conservatory. She was covered with blood and thus stood self-convicted.

I transferred her to a small aviary with a six-feet flight, where she met with an unpleasant end, when a Brown Owl drove its long-reaching talons into her body as she slept against the wire.

There is nothing so expensive as experience !

* * *

FATAL DISEASE IN IMPORTED GOULDIAN FINCHES

By J. P. C. WACHEM (Hilversum, Holland)

Among the seed-eaters the Gouldian Finch is one of the most wonderful. If one, however, sees the great mortality of newly-imported birds, a fancier feels somewhat uneasy at buying them. But being lovers of birds and members of the Avicultural Society (Rules of the Avicultural Society, No. 1 : "... the study of British and foreign birds in freedom and in captivity "), it is our duty to do everything possible to determine the causes of these losses and what can be done to prevent them. Last year I bought a pair of Gouldian Finches out of a very good-looking importation. As this pair was showing symptoms of disease, the price was very low. My opinion was, that had the dealer kept these birds they would have died in a couple of days. I did everything that could be done to keep them alive. Though my home is centrally heated, I placed an electric lamp in the cage and I put honey and some drops of wine in their water to stimulate the working of the heart. The food was a mixture of all kinds of seeds (ripe and germinated), combined with cod-liver oil, milk powder, etc. The result was astonishing, in a few weeks the birds recovered

completely. As they showed signs of broodiness, I placed a small box and nesting materials in the cage, with the result that the hen laid four eggs. Only birdlovers can understand my happiness at this reward of all my trouble. Alas, I had shouted too soon. The same day that the hen laid her last egg in the nest, the cock became ill and died in a few days. There was no one particular symptom. One or two days after the death of the cock, as the female also became ill and showed all the signs of following the cock, I decided to try to cure her by giving aureomycin. I had read an item in *Die gefiederte Welt* in which the author told of his wonderful cures of birds in a hopeless condition, by using aureomycin. The dose is 1/1000 gram per 10 gram body weight, three times a day, during two days. I had ordered very small pills to be made, each containing 1/1000 gram, and during two days I gave these pills (totalling six). The result was astonishing, the second day the bird showed signs of recovery. At this moment the Gouldian is still alive and my friend and I are trying to mate her with his cock. The eggs we put in the nest of a pair of fawn Bengalese ; they hatched, but the Bengalese didn't feed them and after one day this hope also belonged to the past.

One or two days before my cock died, a cock belonging to my friend also died. This cock was of the same importation, but was in first class condition. With the aid of one of my veterinary friends, I sent both birds to the veterinary school of the University for post-mortem examination. A most thorough examination was carried out, even blood cultures were made. The result was negative. It was very remarkable that the organs of my bird seemed to be in a better condition than those of the (? healthy) bird of my friend. There is a possibility that an unknown virus caused the death of the birds. But in this case the investigator must have some idea where to look for the virus in order to prepare the right culture medium. I have observed the wonderful action of aureomycin in the treatment of a Parson's Finch in a hopeless condition, but I quite understand that it is impossible to cure a bird suffering from avitaminosis by this treatment, for in such cases only the correct vitamin is efficacious. I believe, however, that in severe cases of illness of unknown cause, aureomycin is worth trying. But in the case of the Gouldians it is obviously more satisfactory to determine the cause of the illness and losses.

* * *

VISIT OF THE AVICULTURAL SOCIETY TO THE BIRD COLLECTIONS AT THE ZOOLOGICAL GARDENS OF ANTWERP AND ROTTERDAM

By D. H. S. RISDON (Dudley, Worcs., England)

Members foregathered at Liverpool Street Station on Friday evening the 3rd June, 1955. Although the railway strike was on, fortunately our train was running and we caught the night boat to the Hook of Holland, entraining there for Antwerp, where we eventually arrived during the morning. We were met at the station by the Director of the Antwerp Zoo and his wife, Monsieur and Madame Van den bergh, and conducted to the Zoological Gardens where a most cordial welcome awaited us from the President, Monsieur Louis Diercxsens. Replying to his speech of welcome, Miss Phyllis Barclay-Smith said what great pleasure it gave us all to be present and how honoured we felt to be the guests of the Société Royale de Zoologie d'Anvers.

After lunch we toured the Zoo, Monsieur Van den bergh and Monsieur Carpentier, the Curator of Birds, acting as our guides. Naturally, our first visit was to the new Bird House and we were much impressed by this modern method of displaying birds. No wire is to be seen, the birds being confined behind plate glass windows, each cage or enclosure being artistically decorated with natural perches and growing plants. The cages are lit from the top by daylight, the visitors themselves being in a darkened hall lit only by the light from the cages. The effect is quite remarkable and undoubtedly brings out the full beauty and colouring of the birds. For the first time I personally saw the operation of the principle of confining birds by light only. One corridor in this house is completely blacked out, the cages only being brilliantly lit by artificial means and without any sort of barrier between the birds and the visitor. The darkened corridor prevents the birds from leaving their lighted cages. Whilst I am not quite sure whether this is good aviculture, it is certainly a most spectacular method of displaying birds and the specimens we saw appeared in good condition.

Exhibits which stamped themselves on my memory in this house were a beautiful Quetzal, the first live one I have ever seen, and a pair of Red Birds of Paradise in the most perfect condition. The house included a fine collection of Macaws and Cockatoos on stands and I particularly noticed a pair of White-backed Piping Crows, a species I have not seen since pre-war days. The larger softbills were well represented including Toucans, Jay-Thrushes, Touracos, and Glossy Starlings. There were some nice Humming Birds and Sunbirds and I noticed several species of Conure which I had not seen before.

One of the features I liked best about Antwerp Zoo was the birds which were allowed loose about the grounds. We saw Crowned and Demoiselle Cranes and numerous waterfowl walking unconcernedly about the lawns, often crossing the pathways frequented by visitors. A group of some twenty Flamingoes occupied a shallow pond just inside the main entrance, surrounded by nothing more than a lawn and a stone wall about 12 inches high. I was assured that they never leave this enclosure.

The outdoor aviaries were, for the most part, spacious and well planted and contained a huge variety of birds. A particularly spectacular aviary must have measured well over 100 feet long by 40 feet wide and 30 feet high. It contained a mixed collection of Egrets, Gulls, Storks, Gallinules, and even a pair of Occipital Blue Pies and some Jackdaws. I happened to be passing just at feeding time and the movement and colour in this aviary were really wonderful.

Another method of exhibiting the larger birds which impressed me was in a series of outdoor enclosures separated from the public only by a moat. One could thus see such species as Scarlet Ibis, Marabou Storks, and other wading birds without any obstruction to the view. To add to this attraction the moat itself was occupied by various species of duck. The birds were, of course, pinioned or clipped winged, but even so, I was surprised that they did not attempt to cross the moat, which was scarcely more than about six feet in width. The reason is, evidently, that once the birds have become settled in their enclosures they do not try to escape.

I think, without doubt, we were all very much impressed with the remarkably wide and varied bird collection at Antwerp. All the major groups were represented and the excellent condition of the birds spoke volumes for the care and attention lavished on them by Monsieur Carpentier, the Curator of Birds. Our thanks are due to him for all the time he spent showing us round and his kindness and patience in answering the numerous questions we put to him.

On Saturday afternoon by the kind invitation of Monsieur Willy Friling we visited his very fine collection of foreign birds and waterfowl situated in the beautiful grounds of his estate at Braschaat. Monsieur Friling and his friend Colonel John Dufour, who, I gather is partly responsible for the collection, personally conducted us round the grounds. First we visited the aviaries. The birds have separate summer and winter quarters. In summer they inhabit outdoor aviaries, provided only with overhead shelter ; in winter they are transferred to a huge indoor birdroom which is most efficiently fitted out with spacious cages. I must say there seems a lot to be said for this form of aviculture. The birds don't require much shelter in the summer, except from wind and rain, and in the winter they are probably better off anyway inside, thanks to our inhospitable northern climate.

Moreover, it is far more pleasant and comfortable from the attendant's point of view.

I was struck with the attractive way in which each aviary was planted and decorated. Overhead shelters ran along the back walls which were painted white, the floor being covered with clean silver sand. The front and open part of the flights were turfed and planted. The whole effect was light and pleasant and the birds showed up extremely well. Monsieur Friling maintains a large collection in beautiful condition. The number of species is far too great to mention but the highlights I remember, were Bleeding Heart and Bronze-winged Pigeons, Glossy Starlings, Occipital Blue Pies, Jay-Thrushes, and one large aviary which was given over to waders, including Ruffs, Curlews, and Plover. There were some nice parrakeets, mainly of the Broadtail family, housed in a range of aviaries on their own and one enclosure contained an interesting collection of different species of Mynah.

After the aviaries we saw the waterfowl collection. These inhabit a beautiful lake in the grounds and have free range over acres of beautifully kept lawns and grassland. I remember seeing Cranes dancing in the distance and was surprised to see Flamingoes walking about the lawns quite a distance away from the water. Many species of geese and swans were to be seen. The smaller ducks were kept in a stream which eventually flowed into the lake. All the well-known species were represented and I particularly noticed a fine pair of Baikal Teal which I think were the envy of more than one member of our party.

Afterwards we were entertained to tea by Monsieur Friling and his daughter and son-in-law, Mr. and Mrs. Martin, who also acted as hosts. Unfortunately it rained during the whole of our visit ; it was, in fact, the only wet day we had, but the hospitality and kindness of Monsieur Friling and his family and his truly wonderful collection of birds made us forget the weather and we spent a most interesting and enjoyable afternoon.

On Sunday we visited the "Snepkensvijver" Bird Reserve at Lichtaart. This is a large stretch of mixed marsh and woodland and ideal for its purpose, being just the sort of country which most birds love. In the marsh we saw a breeding colony of Black-headed Gulls and our visit could not have been at a more interesting time, as newly hatched and partly grown chicks could be seen everywhere among the tufts of grass growing out of the water. Curlews and Lapwings were abundant and I have never before seen so many Black-tailed Godwits. A most interesting fact I did not know before was the ability of the latter to perch in trees. Several times we saw a bird which had been disturbed from its nest alight in the top of a low growing tree, giving its alarm call—remarkably like that of a Peewit—until we had passed

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Monsieur Louis Diercxsens

President, Société Royale de Zoologie d'Anvers.

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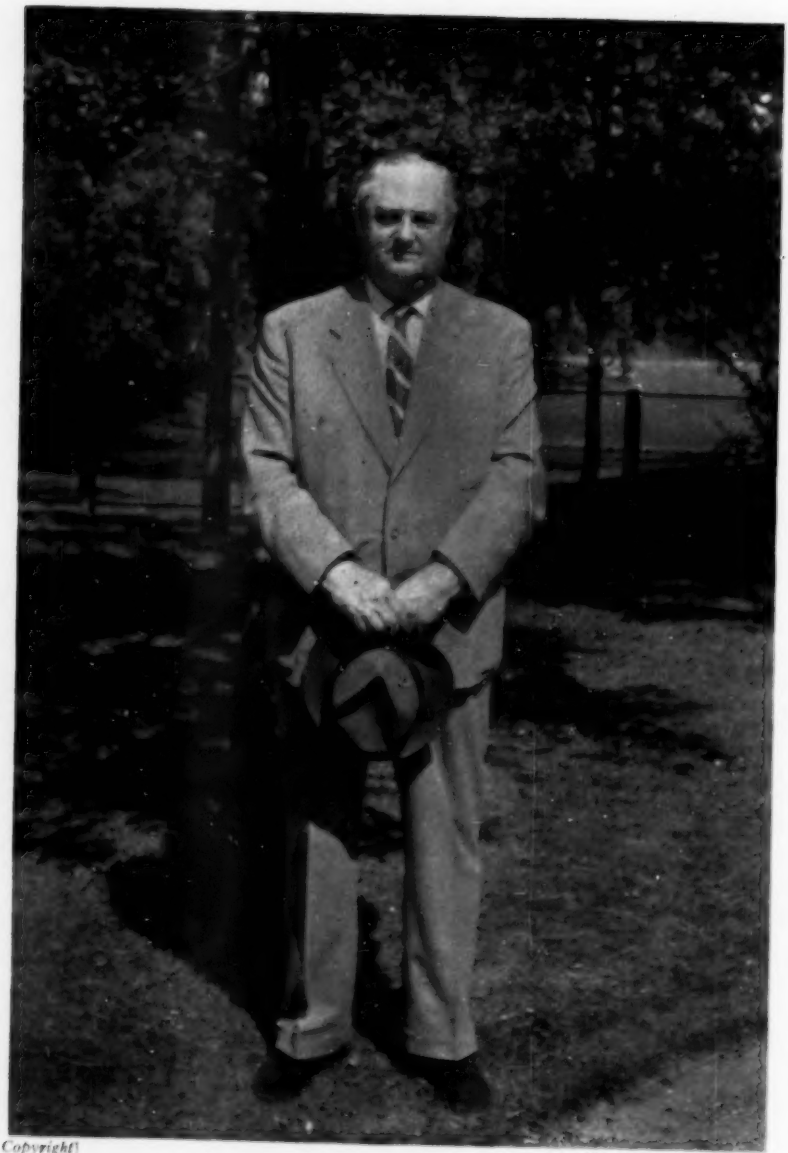

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[Sir Crawford McCullagh

Mr. W. van Resema

Director, Dierenpark "Blijdorp", Rotterdam.

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out of the danger zone. We then followed a path through the woods and undoubtedly the highlight of the afternoon was seeing a hen Golden Oriole on her nest slung from the end of a bough in an oak tree. She never left the nest the whole time we were there and with the aid of field glasses we had an exceedingly good view of her. Later we saw a cock bird, but as it was in silhouette against the sky, it was not possible to see its beautiful colouring although we did hear part of its song.

Other birds I saw for the first time wild were Great Reed-Warblers and White-spotted Blue-throats and we were also shown a Cuckoo's egg in a Blackbird's nest—surely an unusual situation !

Monsieur J. Cuypers, who is the Honorary Warden for this Reserve, kindly gave up the whole of the afternoon to conducting us round. His kindness in answering our questions and showing us all the things which we would never have seen by ourselves, made it far more interesting than our visit would otherwise have been.

On Monday we went by train to Rotterdam where we were met at the station by the Director of the Rotterdam Zoo, Mr. van Resema, who took us straight along to the Zoo. I was impressed again by the general layout of the Gardens. Rotterdam is an up-to-date Zoo, having been largely built, I believe, since the war, consequently it incorporates the modern idea of showing animals and birds in as natural a setting as possible with the minimum of fencing. The general idea is to confine the exhibits by means of ditches and low walls over which the visitor has an uninterrupted view.

There is a remarkably fine collection of Cranes and waterfowl here—regular flocks of them—and how much better they look when kept thus, wandering free in large paddocks, than when seen in ones and twos. Rotterdam Zoo has a fine breeding record and we were not surprised when we saw the waterfowl breeding establishment. This consists of a long range of really extensive pens with a canal running right through the lot of them. Each pen, or enclosure, houses one pair of ducks or geese, with the result that the maximum number of eggs and young are obtained. The eggs are collected and hatched in an incubator and the ducklings are reared in artificial brooders.

I envied Rotterdam Zoo its plentiful water supply from the canals which meander through the grounds.

Finally, we were taken to the tropical Birdhouse. As a Zoo man I had already been thrilled to see several species of mammal which I had never seen before alive, but I was certainly unprepared for the splendour and size of this house. Going in was just like entering a tropical jungle and it is so extensive and so carefully laid out that the visitor appears to wander indefinitely along pathways overhung with every conceivable kind of tropical plant life. Situated here and there, and cunningly concealed among the vegetation, are the aviaries con-

taining a magnificent show of birds. The condition of the exhibits was marvellous. The floors of the cages were covered with silver sand which seemed spotlessly clean. In fact, the whole atmosphere of the place was of an extremely well-kept tropical garden.

On show were such rarities as Cock-of-the-Rock, Birds of Paradise, Roul-roul Partridges, Crowned Pigeons, and some beautiful little Crocodile Birds which took my fancy. This species is about the size of a Golden Plover and similar in shape but most strikingly marked in black, white, French-grey, and cinnamon.

The weather was really beautiful throughout the whole of Monday and it was so warm in the evening that we actually sat down to dinner out of doors with Mr. van Resema as our most entertaining and genial host. This dinner was a wonderful ending to a wonderful week-end, as that night we had to catch the boat back to England.

Looking back, it seems remarkable that we crowded so much into three short days and I think it is here fitting to pay tribute and express our grateful thanks to Monsieur and Madame Diercxsens, Monsieur and Madame Van den bergh, Monsieur Friling, and Mr. van Resema for all that they did to make our visit such an unqualified success. I can only describe their hospitality as lavish and their kindness unbounded. They did everything they could to make us feel welcome and it was entirely due to their efforts that we had such a wonderful time. Personally it was my first visit either to Antwerp or Rotterdam and if this is an example of Belgian and Dutch hospitality, I am certainly looking forward to the next.

One final tribute I would like to pay to our Editor, Miss Phyllis Barclay-Smith, who was responsible for organizing the whole trip. It was thanks to her that everything went like clockwork. She looked after us extremely well and I am afraid we must have been a nightmare to her at times ! Personally, I hate being organized, but Miss Barclay-Smith did it so well and so pleasantly that we were not even aware of it. It is no easy matter to get about twenty wayward aviculturists, each with a mind of his own, to fall into line with a schedule and be on time to catch 'buses and trains, but she never lost a single member of her flock once.

* * *

STUDIES ON GREAT CRESTED GREBES

By K. E. L. SIMMONS (Tilehurst, Reading, England)

Illustrated by Robert Gillmor

(*Continued from page 146*)

4. THE SIGNIFICANCE OF COURTSHIP AND RELATED BEHAVIOUR

By a combination of particular positions of ruff, ears, and neck, and sometimes wings and body too, the birds can assume a number of characteristic, and often-recurring attitudes, *which are the raw materials, so to speak, of all the* habits of courtship. *Let us . . . define* courtship *as a series of actions based immediately or remotely upon sexual excitement, and, to make ourselves clear, we must add that sexual excitement is not merely sexual desire, but that whole emotional state into which a member of one sex may be thrown by a member of the other. What is the good of all these divings and posturings . . . ? To what end are colours and structures developed solely to be used in them, and what return is got for the time and energy spent in carrying them out?*

Huxley, 1914: 495, 527, and 516.

Some millions of words, of greatly varying quality, have been written on bird " courtship " since the early observations of such sound workers as Howard, Huxley and Selous gave impetus to the subject in the first two decades of this century. Huxley's notable paper on the Great Crested Grebe was one of the very first to raise the standards and has remained a most important contribution ever since. Until recent years, however, a great deal of the subsequent work, both in this country and in the United States, has been mainly descriptive. Now we are beginning—if only *just* beginning—to acquire a deeper understanding of the mating behaviour of birds, thanks mainly to the disciplined methods of observation and analysis that the science of comparative-ethology has given us.

The present section re-examines and extends in general terms the information on the courtship of the grebe, against the background of the modern advances in the objective study of bird behaviour. I have already made brief mention of my views on the meaning of grebe courtship in previous sections (pp. 10, 145–6), and here I would like to deal with the " facts and fancies " of such behaviour in more detail, hastening to add that I trust the " fancies " will not prove to be too fanciful and to assure the reader that they do have a solid foundation in fact. It is as well, therefore, to examine some indisputable facts about the subject first of all. Anyone merely describing grebe courtship at the present time does so in a certain air of anti-climax, for it is now well known, thanks to Huxley, and his own paper should be read in full to get the thrill of original discovery at first hand. I do

hope, however, that the new theories on the significance of grebe courtship presented later, as well as the many new facts, will fascinate the reader as much as they have the writer.

I have used the term " courtship " only for those " sexual " displays and ceremonies which are not directly to do with coition; after all we use the word in the same sense when referring to human affairs of a similar nature. The joint ceremonies of male and female are the most conspicuous features of grebe courtship. By " ceremonies," I mean the same as Huxley did by " habits of courtship ": fixed, conventional sets of displays. There are six main displays (Huxley's " attitudes ") which are common to both sexes, and combinations of these make up the four main ceremonies. Each display will be described briefly immediately below, and the ceremonies afterwards. Huxley's account was so detailed that I have included only those descriptive facts necessary for interest, expansion, and subsequent discussion. These have been taken from my own notes mainly, but I have directly quoted relevant passages from Huxley's paper in certain places.

The Courtship Displays

Head-shaking Display

When head-shaking fully the grebe alternates between two types of head movement. The main one, a vigorous sideways waggling " some four or five times in quick succession, like a man nodding emphatic dissent ", is followed by a much slower swing of greater amplitude, " with a seemingly vague and enquiring action, as if the bird were searching the horizon for it knew not what." The bill usually points just slightly downwards at its normal angle, but sometimes, especially at the beginning of an intense display, is tucked well down, and on other occasions is elevated at about 35 degrees. The ornamental feathers of the head are raised characteristically during sequences of these movements: the crest is elevated vertically and sprayed out rather raggedly; the tippets are well spread so that they stand away from the head and frame the white face patch in chestnut and black. The neck, stretched fully upright, looks surprisingly thin and long for most of its length, though there is a noticeable thickening where the shoulders meet it. The whole attitude of neck resembles a small white-wine bottle with its disproportionally elongated neck and a fancy cork. When in this head-shaking posture, the grebe shows to full advantage all its conspicuous frontal features. Apart from the head feathers, more white now appears than normally, from the whole length of the neck and from the upper breast which has been brought out of the water by the stretching of the neck. A last, rather incongruous, feature of the posture is that the tiny apologetic " tail " is cocked right up, although it must be invisible from the front.

Normally, head-shaking display only appears at full intensity when performed in a mutual ceremony with the mate, or potential mate. In the case of flirtations (pp. 133–4), however, the relationship between the birds may be casual. The display may also occur in other, " non-ceremonial " circumstances, usually then at low intensity, without the full posture and with only relatively slight head movement. For instance, an unresponsive partner may shake its head at its mate when the latter is soliciting on the nest, and one-sided display may be seen at nest-relief. As previously described on page 141, a bird in the upright pre-attack posture may do head-shaking movements when about to withdraw.

Habit-preening Display

" This action had obviously something to do with preening but had an extraordinary look, as if of a stereotyped and meaningless relic." In habit-preening, the grebe dips its head backwards and downwards to one side, in a smooth, very precise movement, and raises a few of the feathers of one of the folded wings on the back with its closed bill. Then it brings the head back to its former position, usually the upright, head-shaking one. The habit-preening display is, in fact, very often associated with head-shaking. It is obviously an extreme form of displacement-preening which is more complete than this very symbolic action.

Weed-trick Display

This is initiated by a dive to the bed where the grebe gathers a bill-full of aquatic weed. Surfacing, it swims towards the mate with the bunch of weed dangling, tippets fully expanded " to the extreme elliptical, bringing down the ears (i.e. the crest) meanwhile from the vertical to the lateral position, so that the whole crest (that is the tippets and crest combined) now appeared like a large chestnut-and-black Elizabethan ruff". Head-shaking display may follow, but the penguin-dance is the usual sequel.

Penguin-dance Display

Holding the weed, the grebe swims towards its mate, and when a few feet away rears up out of the water suddenly so that most of its body stands nearly vertically above the surface, with the legs paddling powerfully out of sight to keep the bird up. Normally the partner has done the same and a mutual ceremony results.

Ghostly-penguin Display

This display, which is certainly as strange as the penguin-dance, and even more bizarre, is prefaced by a very shallow dive towards the mate. When the approaching bird reaches the latter or, as often happens, overshoots it, a slow emergence is made from the depths.

" He seemed to grow out of the water. First his head, the ruff nearly circular, the bill pointing down along the neck in a stiff and peculiar manner; then the neck, quite straight and vertical; then the body, straight and vertical too ; until finally the whole bird, save for a few inches, was standing erect in the water, and reminding me of nothing so much as the hypnotized phantom of a rather slender penguin." Huxley named the dive and the emergence, the " ghost-dive "; as it is convenient to have a special name for the peculiar emergence itself, I have adopted his incidental one, ghostly-penguin, for it.

Cat-display

This, the " cat-attitude " of Huxley, has already been briefly outlined and figured on page 144 in its connection with hostilities. " In this position, the beautiful white bar formed by the marginal wing-coverts, along the anterior margin of the wing, and the broad white blaze formed by the secondaries, which are quite invisible when the wings are closed, shone out vividly. The gap between the wings was filled by the head; this from the front somewhat resembled an old-fashioned picture of the sun, with the ruff rayed out considerably all round, and the ears were erected laterally so as to fit on the top of the ruff on either side. Below the head shone the white of the puffed-out breast. The bird's whole appearance was wonderfully striking, and as unlike as possible to that of its everyday self." The cat-display is a regular item of courtship between the mated male and female and figures prominently in two of the ceremonies. Like head-shaking and habit-preening, however, and unlike the weed-trick, penguin-dance, and ghostly-penguin displays, the cat-display may appear outside the context of the formal courtship ceremonies. We have already seen its use by unmated females when threatened, and these birds often adopt it when merely approached by males that have answered their " advertising call " (see later below).

The Courtship Ceremonies

Of the four main ceremonies, two (Head-shaking and Penguin-dance Ceremonies) are strictly mutual with the male and females playing identical roles. The remaining two (Discovery- and Display-Ceremonies) are reciprocal, with the roles of each sex different but interchangeable. None of the ceremonies are preludes to coition, which is preceded by quite a different sequence of activities at the nest-platform.

The Head-shaking Ceremony

" The bout of shaking is not only the commonest form of courtship-action, but it also forms part of all the other more elaborate forms. It always ends a series of actions and often begins them as well." Thus

it is the normal prelude to both the Penguin-dance and Display-Ceremonies, and the normal sequel to both these and the Discovery-Ceremony as well.

A typical, full intensity, Head-shaking Ceremony proceeds something like this. If separated, the male and female swim towards each other, sometimes in a version of the forward-display, perhaps giving the barking call, as described on pages 138–9. The mated grebes are more inclined to approach each other thus, prior to courtship, in the early days following the initiation of their cycle. As they near one another, however, they gradually raise their heads until, when they meet, they are in the upright head-shaking posture, just described above, with tippets and crest displayed. During the last stages of the approach and at the beginning of the resulting ceremony, the grebes utter a characteristic, fast ticking-call like small stones being glanced together, " a rapid alternation of two sounds on two notes: a consonantal sound—*k'p* or *t'c*—on the low note, and an indefinite vowel sound about a tone higher." The barking (threat) call may blend into this ticking one. If the two birds are already close together, they merely start ticking, rear up their heads in display and link up without any more elaborate approach behaviour. Now facing, perhaps only a few inches apart, male and female start the ceremony proper. Initially the bills may be sharply lowered at an acute angle to the neck (which exaggerates the appearance of the tippets by making more of their surface visible to the mate), especially, as Huxley also notes, after aggressive dealings with other grebes. Indeed, the display bout may not progress beyond this if the encounter is not yet fully over. Soon, however, the birds relax their heads into the more normal, less strained, shaking position and the usual alternation of waggling and swaying follows. The movements of the two birds may not synchronize in any way—" the violent shakings of the two neither coincided nor alternated, but each shook and swung without any apparent reference to the other's rhythm." However, sometimes I have recorded a definite rhythmic form of head-shaking: one bird takes the lead and dictates the pace. It waggles rapidly, often with the head pointing upwards, and its mate does likewise, and so on.

Huxley found that a typical bout of head-shaking lasted for about ten to a dozen shakes between both birds, but recorded one sequence in which the two birds gave 84 shakes. After a variable number of fast and slow head movements, first one and then the other grebe may start to habit-preen, perhaps incompletely at first with but a slight backward turn of the head. Then this display may take command of the ceremony. The birds waggle, sway, and dip back to flick up the wing feathers, or waggle and preen without swaying the head in between. Once habit-preening has started the bout never regains its

former tempo again and either ends there and then or eventually fades away.

"The bouts seem, to the casual onlooker, to start themselves—in reality, I think, each bird excites the other. One bird gently shakes its head under the force of rising emotional tension; the other bird had not quite got to that stage, but the sight of its mate shaking acts as a stimulus, and it too pricks up its head a little and gives a shake.

Mutual Head-shaking Ceremony—the sway of the head between the waggling movements.

This reacts on the first bird, and so the excitement is mutually increased and the process fulfils itself. . . ." Many ceremonies start in this way from previous inactivity. Often, too, and especially if male and female are not side-by-side, either of them may more noticeably initiate the bout by approaching its partner and ticking, the two birds working up to a good intensity as they near and assume the display posture. In the events that follow each grebe's behaviour acts to intensify and keep up that of its mate. There can be no complete Head-shaking Ceremony (or any other) without the equal participation of male and female. Often, instead of starting from scratch, as it were, mutual head-shaking is initiated by one of the other ceremonies, as will be described below. I have termed all this kind of head-shaking, which has its origin only in the behaviour of the individual pair itself as *spontaneous*. Much is also *induced*, however, by outside influences. The sight and sound of grebes engaged in a conspicuous Head-shaking Ceremony will often stimulate another

pair to do the same. A characteristic scene in the open water is the simultaneous performance of several pairs, dotted here and there within view of one another. Territorial neighbours may similarly stimulate each other, and Head-shaking Ceremonies are further frequently induced by aggressive encounters. For example, after threatening other birds, or after actively driving out intruders, the territory-owning pair may link up and display, often very vigorously. Birds actually still engaged in hostilities with others, may intermittently join up with the mate and head-shake, although usually such bouts are broken-off in their early stages as the enemy is re-engaged. Sometimes a pair of grebes may head-shake on the sight of intruders instead of going to deal with them. After the abrupt, aggressive end to many a flirtation, the truely mated birds head-shake together.

The forward-display is not an invariable approach attitude prior to head-shaking. It may be entirely left out or merely indicated as male and female sail towards one another with the head just held forward and the neck tucked back in the shoulders. Sometimes the low intensity threat-call (gang-gang-gang) may be heard. In any case, the forward display is never given at absolute intensity to the mate (with rucked-up feathers on the back); it is usually only made at the start of the approach, when male and female are several yards apart, and is only regular during the early days of the pair's display relationship. It is also very likely to occur to the mate after an encounter with rivals and prior to induced display.

There is much intensity variation in the Head-shaking Ceremony itself. The amount of habit-preening ranges from nil upwards to almost a hundred per cent frequency. "The more excitement, the less preening, seems to be the rule; long bouts may degenerate into practically undiluted preening, the head simply being brought more or less up, but not shaken between the 'preens'." There is every degree of completeness in the posture and head movements themselves, from the full ritual already described right down to a few lazy-looking shakes of the head with no stretching of the neck (or even with the head tucked away in the pork-pie attitude !), and without any spreading of tippets and crest at all. While some of this low intensity behaviour is due at times to a joint indifference, much of it results from a lack of response in one of the partners. Often, on the other hand, enthusiasm from one spreads to the other. Thus, sometimes one grebe starts to display weakly but, getting no reaction at all from the other, stops doing so; on other occasions, as we saw above, the second bird is stimulated to reply and then the bout mounts in excitement.

A bout of head-shaking may end in many ways. One or both of the birds may move away, discarding the display posture quite suddenly or drift off while gradually relaxing from their upright position. If

no further display is to follow, the vestigial habit-preening may turn into more complete preening. Often the birds rise in the water and body-shake (p. 101). Any routine activity is likely to occur too, or the nest may be visited and built up. Often, however, another form of courtship ceremony may follow on directly, or very soon afterwards, and more head-shaking as well. Once a very excited sequence of preening and oiling actions interspersed bouts of head-shaking, with much splashing of water. A very much more frequent sequel to an intense Head-shaking Ceremony which has contained little if any habit-preening, is the joint *swimming-together* of the paired grebes, side-

Pair of grebes *swimming-together* after an intense bout of head-shaking (from a photograph by W. N. Charles).

by-side as if going to a definite place. If they have not settled down at a nest-site already, this swimming may soon be superseded by some other activity, the birds going nowhere in particular. But if they have reached the soliciting and copulatory stages of their cycle, it is obvious that this purposive swimming is really directed towards the nest site. When this is reached the more intimate sexual activities may occur there. Other patterns which may less regularly succeed head-shaking include the following. Huxley recorded that one pair " almost always went into a formal back to back, or rather tail to tail, attitude after each bout of shaking ", and, on one occasion, the two birds of another pair dived suddenly away from each other. I have seen a pair, when no other grebes were near to frighten it, in which the male and female turned away after display and swam side-by-side with their tippets tightly closed in the furtive-posture. At another time, the female of an isolated pair backed away from her mate with her head withdrawn and bill open, in the pre-attack posture in fact.

Sometimes, a Head-shaking Ceremony of sorts occurs at the nest, with one bird on the platform itself and the other in the water alongside. This is not, however, a pre-copulatory affair. What has happened is that the soliciting of the grebe on the nest—male or female it may be—has not had the desired effect on the one in the water. The latter has poked about the base of the nest, perhaps added weed and made spasmodic head-shaking movements to which the other has finally responded and the bout received momentum from

their joint efforts. On the other hand, a rather special, post-copulatory Head-shaking Ceremony nearly always occurs; this has not apparently been previously described in the literature and will be dealt with in section 5.

The Penguin-dance Ceremony

This ceremony, like the Head-shaking one, is a strictly mutual affair, and is the least frequently performed of all the grebe's rituals. Huxley saw the Penguin-dance only four times and Selous but once. I have not seen it much more than a dozen times over seven seasons, although observing hundreds of head-shaking bouts in the same period. I do believe, however, that the behaviour is not quite so rare as these records might suggest.

Mutual Penguin-dance Ceremony (adapted from a figure in Huxley's paper).

The Penguin-dance Ceremony, made up of the weed-trick and penguin-dance displays, is the most elaborate of all the grebe's courtship. It seems always to be initiated by a very intense bout of head-shaking, in which habit-preening is not frequent or, probably more usually, not performed at all. The joint diving which heralds the weed-trick follows and, on surfacing, the two birds swim to meet and rear up together. " Coming up with the impetus of their motion, the two birds came actually to touch each other with their breasts. From the common fulcrum thus formed, bodies and neck alike sloped slightly

back—the birds would have fallen forwards had each not thus supported the other. Only the very tip of the body was in the water. . . ." In such a breath-taking union they sway together for a few moments, still holding the weed, and start to head-shake. Still waggling their heads, the grebes sink down slowly from the upright position and another intense Head-shaking Ceremony occurs. In the meantime the weed has disappeared, probably always merely dropped as the couple subsides, though Huxley thought some of it might be eaten.

Sometimes the mutual weed-trick display is followed directly by head-shaking, without the intervening penguin-dancing. Once (27th January, 1951), a female dived, approached her mate with the weed in her bill only to find him preparing for a good head-shaking bout—raising his head, spreading his tippets and crest, and loudly ticking. Ignoring the usual procedure in such cases, which demands her to head-shake also, she reared up in penguin-dance display against him. The male moved back slightly and the female lost her support, a regular Head-shaking Ceremony following. A somewhat similar and unusual sequence was seen on 22nd February, 1953. A pair was adding weed to the platform when some intruding grebes came to view. The male left the *Typha* clump, swam, towards them, and then turned to head-shake with his mate. She meanwhile had left also, still holding the weed intended for the nest, and reared up in front of her mate in the penguin-dance display, then dropped the weed and participated in the Head-shaking Ceremony. In both these cases the one-sided penguin-dancing was unusual. Also, unlike head-shaking, the penguin-dance is not often induced by " outside " influences.

The Discovery-Ceremony

The Discovery-Ceremony is a regular form of courtship occurring more frequently than the Penguin-dance but not nearly so often as Head-shaking. It takes this reciprocal form. One of the pair, it may be the male or the female, dives towards the other in a special way: its underwater course lies only just under the surface and is marked by a narrow but quite noticeable ripple as the grebe progresses. The second bird, some yards away, on seeing the other dive goes into the cat-display and watches the ripple intently as it approaches. The submerged bird usually passes just beyond the one on the surface, which turns about, still keeping the tell-tale disturbance on the water in sight, and comes out of the water in the ghostly-penguin display. "As it grew it gradually revolved on its long axis until at its fullest height it came to face the hen. Though all this was done in an unhurried and uniform motion, yet of course, it took very little time. Then from his stiff, erect position he sank slowly to the surface; the hen meanwhile put down her wings and raised her neck; and the pair settled down to a bout of head-shaking ", which is the almost invariable

sequel. Although in this quotation from Huxley it was the male that performed the whole ghost-dive, and the female the cat-display, I would emphasize that these two roles are definitely interchangeable, a fact about which Huxley was uncertain. On the other hand in hostile and other situations involving unpaired grebes in which the cat-display has appeared, I have so far only recorded it from females. But the male may perform it in a Discovery-Ceremony.

The reciprocal Discovery-Ceremony—the ghostly-penguin and the cat-display.

Huxley's observations showed that the Discovery-Ceremony most often occurs when a mated male and female link up after being *totally* separated. One of them " searches " for the other (in the forward-display, uttering the barking call) which, when discovered, dives and initiates the ritual. There are, however, not infrequent departures from this pattern. Firstly, the couple need not be out of touch altogether but may also at times be separated by as little as a few yards and in full view of one another. Then, in either case, total or partial separation, the ceremony may be initiated by the diving of either the " searcher " or the " discovered ". Thirdly, the forward-display approach, which is no more a regular feature of this ritual than any other, may be present in all intensities from quite high to nil. Also, as Huxley himself notes, the ceremony may be set-off, not by the diving bird, but by one of the pair first assuming the cat-attitude. Occasionally, too, both may display thus before one of them dives.

The Display-Ceremony

This not very elaborate ceremony, on grebe standards anyway, is about as common as the last one. It can be described in relatively few words. During a bout of mutual head-shaking either of the birds, male or female, may quite suddenly break off, turn away and half-fly, half-patter across the water for several yards. When it settles it assumes the cat-display, often a very complete one indeed. and revolves to face the mate which usually swims up to meet it, Another Head-shaking Ceremony follows in which habit-preening often figures prominently. Sometimes the first grebe will merely swim back and rejoin the mate after flying away, without going into the " cat ". Occasionally the other will dash away in turn after the first Display-Ceremony and initiate a second.

A Record from Field-notes

The following field-notes on an actual sequence of observations were made between 14.10 and 16.10 on 27th January, 1951, and give an interesting first-hand example of how the displays and ceremonies take place in nature. They give some idea, for instance, how frequent and varied courtship can be on occasions. Pair A51 were the grebes concerned mainly: they had established themselves in the large Type B territory in the breeding-pool (see p. 136) by 20th January and between that date and the day of the present watching had laid the foundations of a nest-platform. The territories of two other pairs (E51 and B51) joined partly on to A's at two points. Head-shaking is continually referred to below, so I have used the abbreviation " H.S." for it, and also the conventional symbols for male (♂) and female (♀).

When observations began the two Pair A birds were just finishing a bout of H.S. Afterwards, they moved to the edge of the territory and for the next 10 minutes or so called aggressively (etc.) out of sight at a single member of Pair B. ♂ and ♀ became separated by several yards meanwhile, and a Discovery-Ceremony followed (14.20) as they came back to view, with the ♂ in the cat-display and the ♀ performing the ghost-dive. After the rather incomplete H.S. Ceremony that ensued, both grebes once more moved out of sight between the islands, with their necks still stretched (14.23). A minute later the ♂ returned, followed by the ♀; the two linked up and went into mutual H.S. which the ♀ initiated but the ♂ terminated. The habit-preening of the ceremony was done by the ♀ mainly. The pair separated again and went behind the islands. At 14.30 the ♂ reappeared, swimming in the forward display and barking. The ♀ too came in sight in the same posture and then dived, slipping smoothly under the water. At this the ♂ again went into the "cat ", his mate emerging on course and diving again. A second Discovery-Ceremony took place, followed by

H.S. Two more bouts occurred within the next 5 minutes. At 14.38 the ♂ swam threateningly to the border of the territory. The ♀ came along behind him, also in the forward-display, then dived and came up in front of her mate and they H.S. briefly. Both moved out of sight, presumably to deal with a third grebe. Soon after another H.S. Ceremony occurred and when it ended the ♂ dived. The ♀ went into the cat-display but when her mate emerged he was not in the ghostly-penguin, and a normal bout of H.S. took place.

This was at 14.45 and observation on these grebes ceased until 15.25 while I counted the total number of grebes present at Burghfield that day. When watching started again, Pair A was once more H.S., following this up with a Display-Ceremony. The ♀ was the one to turn and patter away. In the ensuing bout there was little true H.S. but very much habit-preening. By 15.35 the ♀ at last visited the *Salix* clump containing the nest-platform, but the ♂ was in another clump several yards away. Both barked in duet briefly before the ♀ left her cover, swam towards the ♂ and dived. He cat-displayed and another Discovery-Ceremony occurred, succeeded by a very long and intense H.S. bout of some 2 minutes' duration. Then the ♂ led the way to the more open part of the territory where yet another H.S. Ceremony followed. The couple moved out of view for a minute or two and after that there was a further bout of H.S., the birds swimming together subsequently to the clump holding the nest. More H.S. occurred and then the ♀ dived, came up with weed which she soon dropped and merely joined the ♂ to H.S. briefly. Within the next 3 minutes she added three loads of material to the nest and the ♂ poked at it once. They went away at 15.51 with the ♂ in the lead and had a mild encounter with an intruding grebe, an induced H.S. Ceremony resulting. The ♀ swam away from her mate and then turned and partially cat-displayed at him (mild Display-Ceremony). He also started to posture in the same way but changed his mind and folded away his wings. Upon this the ♀ ghost-dived and a typical Discovery-Ceremony took place, followed by a long H.S. bout. Soon after, at 16.01, both grebes dived, emerged from the depths, approached each other in weed-trick display and capped it all with a fine penguin-dance. After the inevitable H.S., the pair turned away towards their platform, the ♀ arriving there first. The ♂ then dived and another Discovery-Ceremony followed, with the ♀ taking the " cat " role this time, and yet more H.S. A " mixed " ceremony occurred soon afterwards with the ♀ doing a weed-trick display and then a full penguin-dance against her mate who was in the H.S. posture. The pair briefly separated and was engaged in H.S. when I left the pool a few minutes later.

In 80 minutes of repeated courtship the score was: H.S. Ceremonies, at least 22 (some may have been missed behind the islands); Dis-

covery-Ceremonies, 5 complete ones and one incomplete; Display-Ceremonies, 1 full and 1 mild one; Penguin-dance Ceremony, 1 complete mutual one and a unilateral one by the ♀ who also did a lone weed-trick display. All this was in late January; the pair commenced incubating during the third week of March and their young first saw the light of day towards the middle of April. Their second brood hatched out three parts of the way through June.

The Advertising-display of the Female

I have only recently (1954) outlined this more or less previously neglected behaviour in the B.T.O. journal *Bird Study*, so there is no need to go into full detail here although a more complete statement can now be made. A grebe advertising at full intensity is unmistakeable by reason of its characteristic pose and manner of calling. It floats or swims very slowly with the neck moderately stretched and vertical crest and tippets apparently relaxed. The bird calls intermittently with a loud, far-reaching " grr-owp ", the throat distending noticeably as it does so. This advertising-call is very throaty, drawn-out, and resonant. A second, much quieter sound follows, almost certainly caused by the effort of producing the main note—a moaning, purring " row-ah " like a letting out of breath. The display is essentially a vocal one, the posture merely being instrumental in affording the grebe a good view and in manufacturing the call.

I have recorded this display from *lone and apparently unmated* birds in the open water many times. On a few occasions when I have been sure of the sex of such grebes they have always been females. Also known *mated* females in the nesting-territory—and never the males—have not infrequently been heard and seen advertising when their mates were totally absent or at least well separated from them. All females seem to display thus because they cannot perform joint courtship or other sexual activities owing to the lack of a partner.

In the 1954 paper I stated that I had never known a grebe definitely recorded as a male to behave thus, though the chance of this being merely a matter of coincidence was not rejected. In the 15 months since that paper was submitted for publication, I have made further observations and also discovered some previously overlooked notes. In all cases where the sex of the bird was known, it was a female that was advertising and so it seems safe to suggest, therefore, that this behaviour is a specific feminine behaviour-pattern. If so, it is the only activity that the male and female Great Crested Grebe do not share, apart from the absolute sexual functions.

Huxley certainly saw this behaviour, but he did not draw any special attention to it apart from christening the call the " double-trumpet ". He seems to give one definite and two probable cases in his diary abstracts—all three rather nicely involved females.

Pair-formation

Practically no definite information is to be found in the literature on how new grebe pairs are formed. Huxley himself doubted that courtship played a part in this, and even stated in his 1924 paper in *British Birds* that "There is no courtship until after pairing up". However, my own observations show that, as well as female advertising, some courtship does figure prominently, particularly head-shaking and the cat-display. I cannot pretend, though, that our knowledge of this most difficult subject is near complete enough; much more work is needed, if possible on individually marked birds. Richdale's fascinatingly exact studies on ringed Yellowed-eyed Penguins (*Megadyptes antipodes*) have shown that many more factors are involved in pair-formation than an initial round of courtship, which is all my notes cover.

New pairs are established almost invariably in the open water and not in the territory, mainly during the first five months of the year. Unattached females drift about giving the advertising-call and this sometimes attracts other grebes to them. Certainly at times, and presumably always, these last birds are males. Some are already paired (but inclined to flirt); others have no mate. The unattached males, in turn, seek a partner by approaching a female in the preliminaries of head-shaking. In both cases, whichever sex initiates the proceedings, the female concerned often cat-displays when approached and mutual head-shaking may occur, followed by Display and Discovery-Ceremonies. The couple may then part, at least for the time being, or continue to court.

The Relation of Courtship and Advertising to the Reproductive-cycle

As already mentioned (p. 10), some head-shaking courtship may be seen in many months of the year, though only at all regularly from about January to September, depending initially on the weather. The main courting months are from January to June, but the individual grebe by no means displays with equal fervour or frequency throughout its reproductive-cycle as has often been mistakenly assumed in the literature. This wholly wrong idea does not originate from any direct statement in Huxley's paper. He was not rash enough to reach such a definite conclusion on this point from observations which, though intensive, were also very limited in duration (some two weeks or so in early spring). It was from his theory that the various ceremonies served to maintain the bond between male and female during their long, joint task of rearing the brood, that later writers deduced that the grebe courts as much after egg-laying as before. This is just not true, but Darling (*A Naturalist on Rona*) referring to the grebe and

Huxley's work says that " the display which so obviously gives pleasure to both partners serves as an emotional bond of a union in which protraction till late in the season has a definite biological function ". Richdale (*Sexual Behavior in Penguins*), again referring to Huxley's paper, makes an even more misleading statement (which may be true of penguins but certainly not of grebes) when he states that " the function of love-habits . . . is bond-holding, and is more noticeable *after coition has ceased* " (italics mine).

Grebe courtship declines as the reproductive-cycle progresses, but apart from this relationship, which will be traced in more detail below, there is another. Courtship is most intense in the early days (1–2 weeks) after pair-formation, in the case of new pairs, or after the beginning of the seasonal display of already formed pairs. This relation cuts across that one to the stages of the cycle. For example, a pair that has spent only a day or two courting in open water before establishing itself at a nest site, will display more intensely during the building phase than another couple that has taken 2 weeks over their initial display period. One pair, therefore, may commence the " platform-behaviour " stages (see p. 13) at an already lower courtship pitch than another but, in either case, display will decline both in frequency and intensity as egg-laying approaches.

Relation to the Pre-parental Stages

The onset of courtship starts after the variable winter period of much reduced reproductive activity has ended—when the head-ornamentation, the " display-plumage ", develops again, perhaps as many as three months before egg-laying. There is then much activity in open water and the Head-shaking, Discovery- and Display-Ceremonies are all conspicuous. The length of this first stage of initial courtship varies considerably : some pairs revert immediately to the old territory while others spend many weeks doing nothing after the first big burst of display.

When the nest sites are chosen courting is still relatively common, especially while the birds are still only building. However, when they start to solicit on the platform as well it declines gradually. For example, I watched Pair A51 again on 28th January for 30 minutes longer than I had the day before, when their marathon sequence of display occurred. They were now building quite industriously and also soliciting on the platform, though not copulating. Only 14 Head-shaking Ceremonies and one Penquin-dance Ceremony were recorded in 110 minutes, and no Discovery- or Display- ones at all. Much of the head-shaking was induced by intruders in any case. When soliciting becomes frequent and coition regular, courtship decreases even more noticeably until, when the eggs appear, it has practically ceased.

Penguin-dancing is performed from the building stage onwards. At Burghfield I have never seen it except in the territory at the time when building is well under way, soliciting not infrequent but coition as yet rare. At first it seemed hard to reconcile this with Huxley's observations on the point, for he recorded Penguin-dance Ceremonies in open water from birds to all appearances in the first stage of their cycle. But he watched them on a water devoid of cover *where breeding was impossible*. Some of his grebes were psychologically at the correct stage but physically prevented from progressing with their cycle by the unsuitable environment.

Advertising-display occurs regularly from mated females throughout the pre-parental stages.

Relation to the Parental Stages

I have no records at all of advertising-display or of any courtship proper, besides head-shaking, during the period of incubation (when I once watched a pair for 170 hours all told) or while the young are being reared. Huxley's statement, in a later article in *The Countryman* (1944), that the sitting bird leaves the eggs, searches for its mate and performs a Discovery-Ceremony with it, is almost certainly incorrect. Very low intensity, often one-sided head-shaking display may occur from time to time in such circumstances as when one partner wishes to relieve the other on the nest. All the relatively intense Head-shaking Ceremonies are *induced* and usually follow an aggressive encounter.

Subsequent Broods

When the young are well grown their parents may start to become sexually inclined towards each other again, and occasionally start another brood. This second pre-parental period, whether it culminates in egg-laying or not, is never accompanied by courtship to the extent that the first one was. Head-shaking and, in its own special circumstances, female advertising do occur but normally no other form of courtship.

A Preliminary Discussion on the Nature and Meaning of Grebe Courtship

The main (known) facts about the courtship of the Great Crested Grebe have now been presented and it remains to assess their significance. A fully detailed discussion is not possible (considering space and the present state of knowledge) but I hope this outline will give the general reader a brief insight into the fascination of the theoretical side of the behaviour student's work, and also some idea of the methods employed by modern ethology in such analysis. The three major problems are those of the origin, internal causation (see p. 137) and function of all this complicated behaviour.

The Probable Origins of the Courtship Displays

Displays are what have been called by Tinbergen (1952) "*derived* activities": that is, they have been adapted and modified (ritualized) by natural selection from existing basic movements to serve a new "signal" function between individuals of the same species. No one has yet examined the possible derivation of the display movements used by the Great Crested Grebe in courtship. The way to do this is to compare these movements with those other of the bird's behaviour-patterns *which are not themselves displays*, that is the movements used in preening, feeding, comfort, etc. (pp. 93–102), in fleeing and attack (pp. 139–14), in copulating (see next section) and so on. Any resemblances and connections should be noted.

The origin of two grebe postures have already been indicated, the first having undergone some ritualization, the other not. Thus, the forward- (threat) display is quite obviously derived from the "intention-movement" of attacking a rival across the surface of the water. Then, the body attitude that the female assumes while advertising is mainly a by-product of producing and projecting the special "double-trumpet" call. These are relatively simple cases and the proper courtship movements, with one notable and very happy exception, are much more complicated and of older origin.

Let us first look at those displays used in the mutual ceremonies. The habit-preening display is the initial link in the chain of analysis. There can be no doubt at all that this has its origin in real preening movements. Habit-preening is the familiar companion of the head-shaking display which comprises the two movements of the head (waggle and sway), the upright posture of the neck and the cocking-up of the "tail". When these are examined in turn, first of all two further elements "borrowed" from true preening reveal themselves. These are the waggling action of the head (which has its basic counterpart in the comfort-movement used to detach water and feathers from the bill) and the cocking of the tail (functionally employed to open the oil-gland, apparently)—see p. 100. I believe the slow swaying of the head to be the "intention-movement" of dipping back to habit-preen: this often follows or sometimes replaces it, and every gradient between swaying and full habit-preening may be observed. This leaves open the origin of the upright neck posture. There is another situation besides head-shaking courtship, in which non-functional preening appears. Both the more complete displacement-preening and, rather less frequently, the abbreviated habit-preening itself, occur during hostile encounters between rival grebes when the main tendency is that of withdrawal (pp. 141–2). A strong connection between preening and fighting is suggested, and the resemblance between the upright head-shaking posture and the upright pre-attack one cannot be easily dismissed as merely coincidental. It is but a

small step after this to theorize that the " clash " of the Penguin-dance quite closely resembles the only other situation in which grebes meet in this way, namely the clash of fighting birds. Just as the head-shaking posture (modified from the upright pre-attack one) has had displacement-preening elements superimposed on it, the penguin-dance posture (modified from breast-to-breast fighting) has had displacement-nesting elements similarly attached. The weed-trick is quite clearly based on the collecting and carrying of nesting material : the mutual Penguin-dance Ceremony is a characteristic of the building stage of the cycle and I have already given the case of the female grebe who used weed actually collected for the nest in her subsequent unilateral dance.

An examination of those displays used in the reciprocal ceremonies supports the analysis above. The ghost-dive seems obviously to be a form of " symbolic " attack, with the ghostly-penguin emergence based on the movements for attacking from under-water. I have suggested (p. 144) that the cat-display is a defensive one and it is fitting therefore that it is in fact the normal " reply " to the ghost-dive in the Discovery-Ceremony, and follows the " escape " pattering-away in the Display-Ceremony. I believe that the conspicuous showing of the wing in the cat-display is, like the wing movement used in intense forward-display (p. 138), a ritualized intention-movement of flying. This has been suggested also by Daanje (1950) in a long review of such activities: he points out that the land-bird tends to droop the wings whereas the water-bird raises them because otherwise they would dip in the water. While the forward-display is based on the intention-movement of flying *at* the adversary, the cat-display is based on those of flying *away from* another grebe. It is in fact the " opposite " of the forward-display, the bird withdrawing the head instead of advancing it.

The Probable Causation of Grebe Courtship

Behaviour is caused by two main factors—objects in the external environment and internal impulses or drives. We will deal here with the latter. It seems very probably that, as the courtship displays are based mainly on attack and escape movements, the birds actually feel aggressive and frightened when in the presence of their mates. There is good evidence for this, but it is not the whole story. Theoretically, sexual tendencies are very likely to be present, and I believe that grebe courtship is a very special result of the interplay of all three of these drives, as I hope to show below in a brief investigation of " that whole emotional state " mentioned by Huxley.

No one would deny that courting grebes are sexually inclined towards each other; they must be or full courtship would not be the strictly heterosexual affair that it is. Also, like soliciting and copu-

lation, it declines when the eggs appear and parental behaviour-patterns take command. On the other hand, full courtship may occur many weeks before coition, and declines when soliciting and copulation become regular. Then, head-shaking may occasionally be performed by stripe-headed juveniles (some as young as eight weeks old) and their sexual inclinations can only be very mild at best. It takes place also after adult coition when sexual impulses must similarly be very weak. All this suggests that the sex-drive in courtship is a relatively low intensity one. It is inconceivable, however, that the complicated displays and ceremonies are merely the result of one unenergetic drive. Affairs make sense if it can be shown that such an impulse acts in conjunction with the aggressive and fleeing ones. The combination of the three in varying strengths and dominations produces the courtship. Work on these relations is still in its very early stages.

As I have shown in the descriptive sections, actual attack and escape tendencies may appear from time to time, before, during, and after both the mutual and reciprocal ceremonies. Also the forward-display in some form often preludes these ceremonies, while head-shaking is frequently (and penguin-dancing occasionally) induced by aggressive encounters when bad feelings must be running high. Courtship is more frequent and intense in those early days after the onset of reproductive behaviour: birds are more inclined to feel aggressive and frightened towards their partners at the very beginning of their cycle, before they have had time to get used to close contact with them, as I have recently (1955) shown to be the case with Little Ringed Plovers (*Charadrius dubius*).

The interplay of the three drives may be indicated by the following examples. Mutual head-shaking may be terminated in several ways. The birds can do much habit-preening, which suggests that escape tendencies are coming to the fore. If these assert themselves, one of the grebes may patter away and turn round in the defensive cat-display (the Display-Ceremony). Much habit-preening may be in evidence in the renewed head-shaking bout. Otherwise the couple may break off from a very intense Head-shaking Ceremony and swim-together to the nest (if it has one), showing that a more complete sexual impulse has taken command of the situation. Yet again, a full bout of head-shaking may be followed by a Penguin-dance Ceremony when, I think, both the aggressive and, to a lesser degree, the sexual drives are well worked-up.

The Probable Function of Grebe Courtship

As stated above, displays are " social-signals ", that is they have been evolved by natural-selection to release (or inhibit) an immediate response from a fellow member of the species. One of the great

mysteries of bird behaviour has been the " missing " releaser function of Great Crested Grebe courtship ! It seems to lead to nothing definite, unlike the soliciting-displays which terminate in coition. The answer is as simple as it is obvious : the immediate aim of courtship display is to elicit courtship display in return from other grebe. Courtship begets courtship—mutual or reciprocal—and in such a way do the ceremonies result. Thus, head-shaking bouts build up through the mutual stimulation from both birds and may also be induced by the sight and sound of other grebes behaving in a similar manner. The ghost-dive releases the cat-display (and occasionally *vice versa*) and so on.

What purpose does this serve ? If the birds display together, and they often just cannot " resist " so doing, they are unable to show more functional attacking and fleeing movements towards each other. Courtship both inhibits these " pair-disrupting " impulses and absorbs them at the same time. As already discussed (pp. 137, 145–6), if the aggressive and escape drives were allowed uninhibited expression in such a potentially hostile bird as the grebe, the reproductive-cycle would be seriously interfered with. The origins of the display movements themselves strongly suggests that once, a long time back in the history of the species, actual hostilities between the male and the female were more intense and frequent than they are at present. The courtship has now replaced this (and also very probably acquired further functions of a more long-term nature, such as sexual stimulation and synchronization). In case it should be thought that I have stretched imagination too far, I would point out that one of the more primitive of living grebes, the Pied-billed (*Podilybus podiceps*) of America, does, according to Glover (1953), actually force-copulate in the water unlike any other species of grebe.

The question may be put : Isn't this a very complicated way of soothing over the differences between the sexes ? It certainly is. Grebes are primitive birds, ancestors very similar to the living forms having been found in the Oligocene deposits of 30–40 million years ago. Their courtship belongs to the more complicated era of evolution, being one of natural-selection's earlier answers to the aggressive/escape set-up of pair relationship. Since then the tendency in evolution has been towards the simplification of such processes, a similar tendency to replace the symbolic by the more functional being found in man's customs, including religion. The development of an elaborate courtship system in the grebe was assisted, no doubt, by the large amount of leisure that its feeding and digesting habits left it (pp. 93–4, 98).

(*To be continued*)

REFLECTIONS ON STORKS

By KENNETH SMITH (Paignton, Devon, England)

The storks, like the cranes and herons, have always held a particular interest for me. All birds add charm and interest to the natural scene, but none excels these long-legged species in lending elegance to panoramic beauty. Storks are distributed nearly throughout the world, the White Stork (*Ciconia ciconia*) being the familiar European species. Britain has, as is well known, virtually no storks. The White Stork does not breed here, and comes only occasionally as a very rare visitor.

Few zoos, and fewer (if any) private aviculturists, go in for storks to any extent. San Diego Zoo is, I believe, a happy exception, with a fairly representative collection. Storks are highly carnivorous, therefore quite expensive to feed in numbers, and their very size makes large aviaries or enclosures essential. It is little wonder, then, that storks are almost only exhibited in zoological gardens where admittance or gate money covers the cost of their housing and maintenance. Nevertheless, I have often thought that a place for storks (and perhaps cranes and herons too !) conducted on the Slimbridge style, would be delightful.

Some pleasant days in the tropics were made more memorable to me by the sight of storks. Around Keren I remember trees loaded with nesting Abdim's Storks (*Sphenorynchus abdimii*), and I recollect that later I descended to the hot Eritrean plain and on a small rock mid-stream of the Setit River saw my first Hammer-headed Stork (*Scopus umbretta*). Abdim's Stork is fond of human habitations ; at Keren many nests actually overhung native huts, and some could almost be reached from the ground, but the Africans did not molest the birds, as they believed their dead relatives entered the bodies of the storks.

On Lake Mabesi, in the south of Sierra Leone, flocks of Open-bills (*Anastomus lamelligerus*) flew from the topmost branches of partly submerged trees as my frail canoe pushed through the high reeds towards them. Seen in profile, even in flight, one can see easily the open part of the bill, and when outlined against the sky this feature makes identification certain. This peculiar bill is helpful to the bird in extracting water snails and molluscs from their shells.

It was in Sierra Leone too, that I came across Woolly-necked or Bishop Storks (*Dissoura episcopus*). Four of these engaging creatures were brought to my collecting camp, looking very pious and important. The appearance of piety was increased at feeding times when they bowed repeatedly over the fish and meat offering, as if giving thanks in prayer. These Bishop Storks went to San Diego Zoo, and

Mrs. Benchley informed me they were the first of the African race to be shown there.

Along the Ireng River, which divides British Guiana from Brazil south-west of the Pakaraima Mountains, I have seen handsome Maguari Storks (*Euxenura maguari*). They would not allow close approach, so I watched from a hillside overlooking this valley in an unpopulated wilderness. Their posture suggested contemplativeness, like the herons standing by English willows on the banks of the Evenlode I watched years before. I saw no wild Jabiru Storks (*Jabiru mycteria*) in Guiana, only a single tame specimen in the small Zoo in Georgetown.

Two storks frequently exhibited in zoos are the African Marabou (*Leptoptilos crumeniferus*) and the Indian Adjutant (*Leptoptilos dubius*). They have bare necks like vultures, and like those birds they scavange at carcasses. Both species are fairly hardy and do well in confinement.

Strangest of all storks is the Shoe-bill or Whale-headed Stork (*Balaeniceps rex*) of the White Nile region. It is usually seen standing solitary in marsh or papyrus swamp, where it seeks fish and frogs. Its grotesque bill makes the Shoe-bill a desirable and attractive Zoo inmate, but it needs considerable care. It must have constant access to a pond or pool ; Dr. Vevers told me this was proved vital in London Zoo, otherwise the feet and legs were soon affected and disaster ensued.

As civilization spreads over wild lands, steadily and inexorably year by year, storks, like many other large birds, will find living conditions more and more difficult. Their age-old habitations are being destroyed or spoilt by general development undertakings, and especially by the drainage of marshes and pollution of rivers. Hydro-electric schemes, like the Kariba and Kafue projects in the Federation of Rhodesia and Nyasaland, are followed by widespread networks of overhead power lines. Large birds like storks often collide with power cables or sometimes meet death by electrocution. The modern method of locust control involving the use of poisons is another menace.

In conclusion, to offset to some extent these melancholy thoughts, one must acknowledge the increasing interest in wild life and fauna preservation. This interest is stimulated by the press and cinema and by sound radio and television. Our priceless animal life heritage, storks included, can perhaps be saved for posterity if this great and growing popular interest can be converted to channels of positive and practical action towards conservation.

* * *

THE FIRST BREEDING OF THE YELLOW RED-RUMPED PARRAKEET IN THE U.S.A.

By David M. West (Montebello, California, U.S.A.)

A first breeding of any species or variety is probably an event worth recording in the pages of the Avicultural Magazine, and for that reason I send these notes on what is probably the first breeding of the yellow variety of the common Red-rumped Parrakeet. Possibly, to be on the safe side, I should say that the young female yellow Red-rump I reared this year is the first to my knowledge. (In the U.S.A.)

The early history of the yellow variety has been given by the owners of the Keston Foreign Bird Farm in the Jan.-Feb., 1949, issue of the *A.M.*, page 12. Possibly the salient point is that the first and original matriarch of this line was a wild-caught bird sent from Australia to the late Duke of Bedford in 1935 and that her progeny provided the basis for the yellow Red-rumps now in Europe and in many other countries. It might be noted, however, that A. A. Prestwich, in *Records of Parrots Bred in Captivity*, Part VI, mentions that other yellows or " cinnamons " have been bred in Australia on several occasions. Personally, I feel that the term " yellow " is quite an adequate description of the bird, where it would be quite inaccurate to term this black-eyed, sex-linked mutation a " lutino ". I note that Mr. Brooksbank prefers " pastel " to " yellow ".

The first yellow of this variety I can recall seeing was at a dealer's shop about 1950. This bird, a female, was sold to a local aviculturist, but to date she has not reproduced, despite all efforts on the part of her owner to provide her with a suitable husband and accommodation.

I obtained my first cock split yellow Red-rumps during the summer of 1953. My first efforts with these split cocks were very discouraging. One bird had a slightly withered foot and never prospered and eventually died. The remaining cock flourished and during the 1954 breeding season reared two young, both normal coloured, which turned out to be a pair. A second nest in 1954 consisted of four clear eggs and during the present breeding season they did not breed at all, though mating was observed. I think it very odd, since this year they were in a much larger and better breeding flight—but they never really settled down, so possibly next year they will do better. Incidentally, I might add that the young reared in 1954 themselves reared three young cocks in 1955 and have a second nest at this time (May, 1955).

In 1954 I was very fortunate in securing another split cock and his mate—a yellow hen. These were really exceptionally fine birds, very large and robust, and great hopes were entertained for them. However, counting your chickens, or yellow Red-rumps, before they hatch is a

poor policy and the lovely yellow hen got stuck in the moult and died.

Her mate is one of the finest cocks I have ever seen and so it was decided that the only alternative was to mate him to a young normal female, especially chosen for her size and good colour. They were placed together in the fall of 1954 and hit it off perfectly, with the male flying instantly to her side and display and feeding taking place within a few minutes of their introduction.

Throughout the winter the pair continued to be devoted and exhibited the devotion to each other that mated pairs of Red-rumps characteristically show. It was a great disappointment, then, when one morning in February the hen was found to be in a semi-paralysed condition. This condition persisted, and each day she grew a little weaker and more helpless and eventually died. A post-mortem revealed a ruptured vessel in the brain and the probable cause was a night fright caused by some cat.

As the breeding season was now fast approaching, every effort was made to find a good breeding hen. Although a two-year-old hen would have been preferred, the only available hen was a year-old bird and so she was obtained.

The cock was now, in early March, in high breeding condition, and for this reason I hesitated about releasing the hen directly into his aviary. However, this plan was followed and the cock expressed his immediate approval and satisfaction by displaying and calling and attempting to feed the new arrival. For the first few days the hen was a little skittish and did not accept his advances too readily, but fortunately the cock did not fly into a rage, and was reasonable about the situation, so that at the end of the week the new hen was quite ready to be courted. As March progressed, a nest was introduced and the hen became quite steady and very much interested in the nest-box. Within a few days after the introduction of the nest-box, pairings were observed during the early morning and evening hours. After this the hen began to spend an increasing amount of time in the nest getting it ready for family use.

During the first few days of incubation the hen was nervous and sat very lightly, coming off if anyone entered the aviary. Within a few more days she settled down and was rarely seen out and away from the nest. If she did observe anyone about when she was off feeding, she would immediately fly to the box and tumble in it with great rapidity. At the end of the second week of incubation a chance to inspect the nest presented itself, and a very cursory glance revealed seven eggs, the majority of which appeared fertile.

About the twenty-third day after incubation began, a broken egg-shell was found on the floor of the aviary. With this favourable sign the amounts of hemp, soaked bread, and greens such as *poa annua*, were increased. Very large amounts of food were eaten and since the

nest-box was known to contain seven eggs, one could hardly resist dreaming of seven youngsters—at least some of them yellows !

All continued to progress smoothly and after the end of the first week the hen continued to spend more time away from the nest. Both parents continued to eat large amounts of food, so it was felt that the young were probably progressing satisfactorily. When the babies were about seventeen days old, I weakened, and took a look. There were five youngsters and one egg—but no sign of the seventh egg. The examination revealed what had been secretly hoped for—a lovely yellow chick, with just a few of the yellow feathers beginning to appear.

From this point on, no further investigations were made. The young began to leave the nest about the thirty-third day subsequent to the estimated date of hatching and were easily seen to be three cocks and two hens. Upon first leaving the nest the youngsters were a little uncertain on the wing, but this condition improved very rapidly and within the week they were very expert.

From past experience with Red-rumps and their close ally the Many-coloured, it was realized that a careful watch would be necessary to prevent the parents from turning on their young in their zeal for a second nest. Beginning about the fifth day the male began to chase the young males about and, so as to protect the youngsters, he was caught and placed in an adjoining pen. He continued to feed the young through the wire and at the end of the tenth day the five young were caught up and placed in another aviary and the parents then placed together again.

A few notes on the physical surroundings of this pair may be of some value and interest. The breeding pen was 8 feet high, 3 feet wide, and 15 feet long. A shelter at one end was provided, though the pair used it only on rainy days, very seldom using it on a rainy night. They like to roost in a corner against some of the wooden studs and in one of the most exposed portions of the aviary.

The diet consisted of all the sunflower they wanted and another bowl of mixed canary, millet, hemp, and oats. They are not very fond of fruit, but will eat a little of their daily apple and orange. They like fresh corn on the cob and will spend a great deal of time working on an ear of it. Greens of all kinds are appreciated.

The nest-box itself was about 12 inches wide, 10 inches high, and about 18 inches deep—a little larger than is usually used for Red-rumps here in California. The nest was hung just under the edge of the shelter, so as to provide maximum ventilation and light and still not be in the rain or sun. Fine wood chips were used inside the box.

Young Red-rumps mature very rapidly and often will breed when just a year old. My personal experience has been that they are never safe with other birds during the breeding season. I have had extra

males that would not hesitate to attack Crimson-wings in the spring, although they were agreeable enough together during the winter months. A pair of Red-rumps will work together in a team (like Blue-bonnets) in any fracas and, so to be on the safe side, it is best to keep the Red-rumps apart from mixed collections of birds.

Young males colour rapidly and within a few short months after leaving the nest are nearly in adult plumage. Males of the year are almost never as bright as older males, but there are exceptions. A young male raised two years ago was always a more brilliantly coloured bird than the father and unusually highly coloured upon leaving the nest.

As the yellow Red-rump is a sex-linked mutation, the next step is to mate the yellow daughter back to her father, and from this union yellows of both sexes might be anticipated. As I have never seen a yellow cock, I am very hopeful that next year will produce at least one yellow Red-rump cock.

* * *

SOME HYBRID WATERFOWL

By W. H. Payn (Hartest, Suffolk, England)

During the past few years a number of hybrid ducks of definite parentage have been reared in my collection here in Suffolk. Whilst I am aware that hybrids are not to everyone's liking, I nevertheless feel that a description of them should be recorded in the Avicultural Magazine for the benefit of those interested in the interbreeding of species.

At least two of these hybrids have occurred before in captivity, one fairly frequently. Pairs of the first two are now on view at the Wildfowl Trust, Slimbridge.

Common Sheld-duck (*Tadorna tadorna*) × Ruddy Sheld-duck (*Casarca ferruginea*).

A brood of eight was reared, four males and four females.

Day-old Duckling.—Like Common Sheld-Duck, with pale spot in centre of dark patch on shoulders.

Adult Male.—An extremely handsome bird, resembling the Common rather than the Ruddy Sheld-Duck, in voice, build, shape of bill, and general habits.

Body colour a very rich, deep chestnut ochre, much darker than the Ruddy Sheld-Duck. Head deep chestnut-brown; cheeks, paler; traces of white collar. Belly deep brown; rump, greyish-white, heavily pencilled black. Tail and upper tail-coverts glossy black; under tail-coverts rich chestnut. Wings as in Common Sheld-Duck, but

scapulars pencilled black. Secondary wing-coverts have inner web white, outer web chestnut. Feet and legs grey flesh ; bill pinkish, mottled black.

Adult Female.—Greyish, heavily pencilled black, but with a bright chestnut wash on breast and shoulders, and a pale chestnut wash on wings and lower back. Belly dark brown. Head greyish-chestnut with broad white collar. Eyelids and base of bill white. Bill grey with slight pink tinge. Wings and feet as in male.

PINTAIL (*Anas acuta*) × MALLARD (*Anas platyrhynchos*).

Three reared, two drakes, one duck.

Day-old Duckling.—Exactly like Pintail, but more robust.

Adult Male.—Head deep bronze-green with broad white collar extending up sides of neck. Mantle and flanks light grey finely pencilled darker. Upper and under tail-coverts black. Breast brownish-orange, darker at sides. Belly white. Tail black, centre feathers elongated and slightly up-curled (much longer and less curled than in Mallard). Wing mirror dark green with chestnut bar above and black-and-white bars below. Bill as in Pintail drake. Feet and legs yellow-ochre, webs darker.

Adult Female.—General plumage pattern follows female Mallard, but colouring much greyer. Head like Pintail but greyer, fringes to mantle pale and narrow. Lower breast white, less heavily streaked than Pintail. Two central tail-feathers elongated. Upper wing-coverts greyish. Wing mirror as in male. Feet and legs greyish-ochre, webs darker. Bill dingy yellow. In general appearance these hybrids resemble Pintail rather than Mallard, being slim and long-necked.

TUFTED DUCK (*Aythya fuligula*) × MALLARD (*Anas platyrhynchos*).

Two hatched, one female reared.

Day-old Duckling.—As Mallard, but darker.

Adult Female.—Resembles a large, thickset Tufted Duck. Head dark brown, cheeks paler, heavily freckled darker. Mantle, lower back and upper tail-coverts rich dark brown, with paler fringes. Tail grey, under tail-coverts whitish. Breast brownish, heavily barred dark brown. Belly and flanks dirty white, mottled grey-brown. Wing-mirror greyish with two white bars. Scapulars have greenish sheen. Iris dark brown. Feet grey-green, webs black. Bill black with grey band.

This bird began diving freely when about seven days old. In general habits resembles Tufted Duck, but it is a noisy bird, with a harsh quack.

In addition to the above, a hybrid Common Teal (*Anas crecca*) × Shoveler (*Spatula clypeata*) was reared here in 1943, a full description being published in the *Ibis*, October, 1943, and *Bull. B.O.C.*, May, 1949.

MY LANCEOLATED JAYS IN 1955

By Derek Goodwin (Virginia Water, Surrey, England)

Those who read the previous accounts (Goodwin, 1953 and 1954) of my Lanceolated Jays may perhaps be interested to learn how they have fared (so far) this year.

Once again the male Yellow (birds are named after colour of their leg rings) and the female White refused to pair with each other, even though I had moved them to an aviary some way away from, but unfortunately not out of sight and hearing, of the others. Green and Blue nested early in the same site as in 1954. Blue laid the first of her clutch of five eggs on 13th April. The previous two mornings having, as previously, seen " dress rehearsals " of the laying.

On 30th April at least two young had hatched. On 5th May, when I looked again the nest contained three young only, two of which were somewhat larger than the third. On 7th May only two young remained. Blue's belly feathers were stiff and clotted with dried blood, so that she is very strongly suspected of having killed and eaten one of her children. The young stayed rather long in the nest or on its edge and it was not until 24th or 25th May that they definitely left it. Next morning, after a wet night, one was found soaked and dead among the grass. The other is so far (date of writing, 22nd June) doing well. It has been feeding itself to some extent for about ten days, but is still fed regularly by Green, although its mother, Blue, has recently lost interest in it and attacks it when it begs from her.

The feeding regime differed from that of last year only in that, owing to the lateness and scantiness of the local caterpillars and cockchafer crops, I was unable to supplement the ration with these. Hence mealworms and ant pupæ were at least 99 per cent of the insect food given the young. Perhaps as a result, the young developed rather more slowly and the survivor showed a marked improvement after leaving the nest, due, I think, to the parents then feeding milk-sop and other artificial food to a greater extent. As with the 1954 young one, the present bird, although showing all the other typical juvenile plumage characters, has the blue on wings and tail as bright as in the adults.

To my surprise Blue, in early June, laid three more eggs in the same nest, which they had relined after removing the old lining. As I contemplated leaving home for some weeks in late June, I was a bit perturbed at this development. Blue, however, solved the problem by eating or hiding her eggs (I suspect the former) after having incubated about a week. This may well have been due to my looking at the nest too often. I think, however, the time of year and onset of the moult may have been of more importance in causing this lapse.

I think the laying of a second clutch was an unnatural piece of behaviour caused by the birds not having to expend a great deal of energy in seeking food for their young, as wild Jays do. Certainly the male Green was in full sexual condition throughout the whole of the incubation and rearing periods, constantly displaying to his mate and often trying to copulate with her, whenever she came off the nest.

The behaviour of the birds was as in 1954, Blue protesting violently whenever I went anywhere near the nest, but Green showing no signs of alarm or anger. If, however, a stranger entered the aviary he would at once scold as vehemently as his mate.

REFERENCE

GOODWIN. 1954. "Lanceolated Jays Breeding in Captivity." *Avic Mag.*, 60 : 5, pp. 154–162.

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PAN-AFRICAN ORNITHOLOGICAL CONGRESS IN 1957

The South African Ornithological Society intends to organize a Pan-African Ornithological Congress at the Victoria Falls in July, 1957. The duration of the Congress, excluding the excursions, will be one week. An estimate of costs will be put out in the near future.

The Congress will be organized on the following lines :

Sections. Papers will be divided into the following sections, which may be further sub-divided, if necessary :

Systematics and Anatomy
Breeding and General Behaviour
Conservation
Migration
Ecology and Distribution.

Each Section will have a Chairman, who will be an ornithologist from Africa, having knowledge of the subject. Each Section will also have a Recorder, whose primary duty will be to note the main points raised in the discussions.

On the final day of the Congress, distinguished ornithologists specializing in the subjects of each section will be invited to sum up the contribution made by the papers in that section.

Hours. The hours for the sessions will be 9 to 12.30 in the mornings, and 2.15 to 4.45 in the afternoons.

Excursions. There will probably be three excursions, one or two before the Congress begins and one or two after it has ended. One of these excursions will probably last a week and others two or three days each.

Scope. Papers submitted to the Congress must be of one or other of

two kinds: either general reviews of the present position in a special branch of ornithology, with or without special reference to Africa, or specifically African in scope.

Publication of the Proceedings. The Chairman and Recorder of each Section will be responsible for preparing the papers and summary of the discussions in their own Section for the Press, under the co-ordination of a General Editor. Papers will be printed in one volume.

Further Information. Further information will be sent out from time to time. Those interested in receiving it promptly are asked to send their names now to the Hon. Secretary, South African Ornithological Society, P.O. Box 1616, Cape Town, South Africa.

* * *

As papers on avicultural subjects have been conspicuous by their absence at the International Ornithological Congresses in recent years, it is to be hoped that this deplorable state of affairs may be remedied at the Pan-African Conference and that papers will be forthcoming. —ED.

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LONDON ZOO NOTES

By J. J. YEALLAND

The true wild Canary (*Serinus canarius*) must be a rare bird in collections nowadays. These large Serins must originally have been kept more for their song than for their appearance. They seem to have been first imported into Europe early in the 16th century and evidently took well to captivity, for it is of course from them that the many fancy breeds have been evolved by selective breeding. Four of these wild birds have been presented by Señor Martins of Madeira, where they are apparently not uncommon, but I do not know whether they are still plentiful in the remainder of their range—the Canary Islands and the Azores. It will be interesting to see how their song compares with that of the domesticated birds.

Other birds of interest received during the past two months include eighteen Tovi Parrakeets (*Brotogeris jugularis*), two Petz's Conures (*Eupsittula canicularis*), and a young Amazon parrot not yet identified. These were all sent from San Salvador by Mr. W. H. Chippendale, who also sent a White-browed or Spectacled Parrot (*Amazona albifrons*), but it was ill on arrival and died a few hours later.

Some waders—a Redshank, a Bar-tailed Godwit, a Turnstone, an Oyster-catcher, a Dunlin and two Ringed Plovers—have been presented by the Copenhagen Zoo. Two Fraser's Eagle-Owls (*Bubo pænsis*), a Common Quail (*Coturnix coturnix*), and a Forest Senegal

Kingfisher (*Halcyon senegalensis fuscopileus*), new to the Collection, have also been presented.

The most delightful of the newcomers are four Sun Gem Humming Birds (*Heliactin cornutus*) and a Frilled Coquette Humming Bird (*Lophornis magnifica*), neither species having been in the Gardens before. The Sun Gems are exquisite; they have black faces and black pointed beards, the top of the head is a metallic blue and on either side of the head is a horn-like tuft of golden-green feathers. The back is pale golden-green and the underside is white, while the long tail is brownish-green and white. The females are golden-green above and white beneath. The Frilled Coquette must be one of the very smallest of the Humming Birds and the wings are comparatively short, so that the hum produced in flight is of a higher pitch than that of the longer-winged birds. All these were presented by Mr. H. Randau.

A Brazilian Swallow-tailed Humming Bird (*Eupetomena macroura*) has been received in exchange.

The nesting birds include King Penguins, two pairs having eggs, Snowy Owls, Grey-winged Trumpeters, Brush Turkeys, Red-breasted Geese, Green-winged King Parrakeets, Quaker Parrakeets, Masked Lovebirds, and Cockatiels. The Rheas have three eggs so far, the Choughs nested but threw the eggs out, and the Stone Curlews have laid two or three clutches, but do not sit on them, possibly because of the presence of other Stone Curlews in the aviary. Egyptian, Upland and Canada Geese have some well-grown goslings.

Three Sunbirds have just arrived from Singapore as a present from Squadron-Leader K. C. Searle. They are two male Malayan Yellow-breasted—Yellow-bellied would be a more appropriate name—and a Malaccan or Brown-throated (*Anthreptes malacensis*), a far more beautiful bird than it appears from the coloured plate in *The Birds of the Malay Peninsula.*

* * *

BRITISH AVICULTURISTS' CLUB

Meetings and dinners during the 1955–56 session have been arranged for the following dates :—

14th September, 1955
9th November, 1955
11th January, 1956
14th March, 1956
9th May, 1956

ARTHUR A. PRESTWICH,
Hon. Secretary.

NEWS AND VIEWS

Major Albert Pam celebrated his eightieth birthday on 27th June, 1955, and a telegram of congratulations was sent by the President and Council of the Avicultural Society.

* * *

Adelaide Zoo.—Once again the old pair of Rheas has produced a family. Six healthy young ones were hatched. Unfortunately one of these was subsequently injured and died, but the other five are well on their way to being added to the large colony of Rheas in the Zoo.

* * *

The late Duke of Bedford's famous blue Ring-necked Parrakeets have successfully reared a nest of four at the Keston Foreign Bird Farm. This has been a good season for blues as progeny of this pair have reared three young with Mrs. G. T. Clark, and three with E. N. T. Vane. In addition, David West has bred two in California.

* * *

On 3rd July John Yealland, Curator of Birds, Zoological Society of London, flew to British Guiana to supervise the packing and transport of the birds and animals collected by the joint B.B.C. and Zoological Society collecting and filming expedition, under the leadership of J. W. Lester.

The state of Jack Lester's health necessitated his return to England by air, instead of by sea with the collection as intended.

* * *

C. M. Payne reports a " Spotted Towhee in the nest which is twelve days old and doing well. The parents laid three eggs but only hatched the one youngster ". Neunzig says the Red-eyed Ground Finch, or Towhee (*Pipilo erythrophthalmus*), " has been repeatedly bred " ; first by G. Landauer, according to Russ. But this would seem to be the first time the Oregon subspecies (*P. maculatus oregonus*) has at least partially reared a young one in captivity.

* * *

Edinburgh Zoo.—D. Bowles, Director-Secretary, reports of the penguins in 1954 : " Several records were established in breeding these birds. In the first place, a total of fifteen were hatched and reared without loss ; this is the first occasion upon which no chick has died before reaching maturity but it is only fair to say that the exceptionally wet summer may have contributed to this success. The distribution of births among the species was seven Kings, four Gentoos, three Maccaronis, and one Ringed."

* * *

Should the vernacular name of *Eudyptes chrysolophus* be spelled

Macaroni or Maccaroni? Dr. Newton suggests it might have been a name applied by seamen when the word was a cant term for a fop or exquisite, with his hair dressed in extravagant fashion, this bird having its head more conspicuously adorned than its congener *E. crestatus*, the Rock-hopper Penguin, amongst which it breeds. If this suggestion is acceptable the spelling with one " c " is the correct one.

* * *

Breeding reports from C. af Enehjelm, Helsingfors. Lesser Rock-Sparrow (*Petronia dentata*).—First nest, two young left; second nest, one young; third nest, two eggs, not hatched; fourth nest, sitting on three eggs. Little Owl (*Athene noctua*).—Five young ones left the nest and all are thriving. Bred in an indoor flight. Wood Pigeon (*Columba palumbus*).—Two young fledged. Guiana Parrotlet (*Forpus passerinus*).—" This year I put up one pair in one of my indoor flights. Seven youngsters left the nest, two died later."

A. A. P.

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NOTES

Parrots in Sir Edward Hallstrom's Collection

I have just returned from a very brief visit to Sydney and took the opportunity of seeing Sir Edward Hallstrom's collection and also Taronga Park. Sir Edward now has ten of the true Golden-shouldered Parrakeet (*Ps. chrysopterygius*) which I had never seen in life before, as well as several hybrids bred from the first two cocks he obtained, mated with Hooded hens. He has a large number of the hybrids from Many-coloured × Hooded and whilst the adult cocks are quite close to Paradise Parrakeets (although having a yellow instead of a red frontal band), the adult hens are not a bit like Paradise hens, but are intermediate between Hooded and Red-rumped hens, without even as much colour as a Many-coloured hen. Another bird new to me was the Blue-cheeked Rosella (*Pl. amathusia*) which is the extreme northern race of the common Pale-headed or Mealy Rosella (*Pl. adscitus*). They have more blue on the cheeks, a creamy patch on the upper breast, and the lacing on the mantle is not as golden as in the Pale-headed, but appears to be suffused with blue. In addition, they are smaller. Sir Edward had three examples of these. He has a large number of yellow Indian Ring-necks, breeding freely; almost certainly the only ones in Australia. There were several pairs of Musschenbroek's Lorikeets (*Neopsittacus musschenbroeki*) and two pairs had a recently fledged young one; I am not sure whether this breeding success of his has been recorded previously.

He now has ten fine examples of the Glossy Black Cockatoo and the young bird that he bred last year is now independent. He still has quite a number of the Double-eyed Dwarf Parrot (*O. diophthalma*) which have hatched young but never reared them; he also has a single example of *O. edwardsi* (a hen).

Taronga Park is always interesting. New birds to me that were on exhibition there were the White-headed Pigeon (*Columba norfolciensis*), which is commonly known as the " Baldy ", and a Grey Goshawk (*Astur novaehollandiae*) which I had once seen in the wild state, but never in captivity. They have nearly 150 Birds of Paradise on exhibition.

I still have no birds of my own, but my elder son acquired a pair of Leadbeater's Cockatoos last spring and they promptly reared a young one for him! He is now anxious to try out some of the other Cockatoos. He also has a pair of Red-collared and a pair of Scaly-breasted Lorikeets.

Alan Lendon.

CANDIDATES FOR ELECTION

Mrs. D. Bevington, Gallowbrook, St. Neots, Hunts. Proposed by P. C. Bath.

P. Harwood, Glebe Road, Darlington, Western Australia. Proposed by Sir Crawford McCullagh, Bart.

Mitami Kagawa, Ritsurin Park Zoo, Takamatsu City, Kagawa-Ken, Japan. Proposed by A. A. Prestwich.

G. R. McLachlan, Museum and Snake Park, 28 Bird Street, Port Elizabeth, South Africa. Proposed by Dr. P. H. Bunton.

A. McLean, B.Sc., M.R.C.V.S., D.V.H., Bellevue Zoological Gardens, Belfast, N. Ireland. Proposed by Sir Crawford McCullagh, Bart.

Dr. J. Nicolai, Max Planck-Institut, Buldern üb. Dülmen/Westf., Germany. Proposed by A. A. Prestwich.

C. Oliver, 135 Mill Lane, Denton, nr Manchester. Proposed by A. Martin.

J. Richardson, 106 Bransty Road, Whitehaven, Cumberland. Proposed by G. J. Irving.

NEW MEMBERS

The sixteen Candidates for Election in the May-June, 1955, number of the Avicultural Magazine, were duly elected members of the Society.

CHANGES OF ADDRESS

Wolfgang de Grahl, to Otto Ernst Strasse 6, Hamburg-Groesflottbek, Germany.

D. C. Franks, to Argyll, 75 Old Road, Harlow, Essex.

N. A. Lee, to 31 Abbeyville, South Shore, Blackpool, Lancs.

Dr. N. A. Rositer, to Colonial Mutual Bldg., West Street, Durban, Natal, S. Africa.

Payson Vucovich, to 15731 Fargo Avenue, Hanford, Calif., U.S.A.

G. E. Whitmore, to 40 Charlemont Avenue, West Bromwich, Birmingham.

CHANGE OF STYLE AND ADDRESS

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